THE

JOURNAL OF GAS LIGHTING.

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVI. No. 377—19th YEAR.] LONDON, APRIL 2, 1867. [Subscription per Ann. 15s. in Advance 18s. Credit. TREBLE No. 1s. 4d. Unstamped.

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1862.

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4. The gas passing without being registered at all.
5. The temptations and facilities to fraud which it is notorious the Wet Meter presents.

1862.

CLASSES X. & XXXI.

6. The damage to house property which the impracticable attempt to keep the lights from jumping, by giving all the pipes a gradual ascent from the Meter, so as to admit of the water trickling back into it, necessarily occasions.
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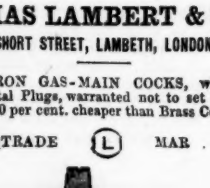

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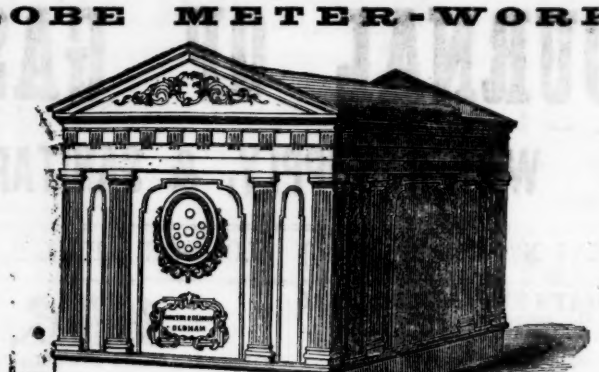

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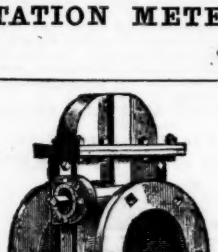

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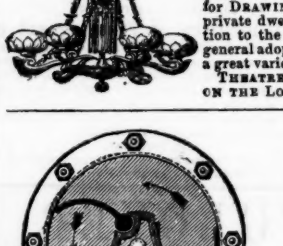

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☞ *See "Practical Mechanic's Journal," Dec.* 1, 1865; *also, p.* 711 "JOURNAL OF GAS LIGHTING," *Sept.* 18, 1866.

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ANOTHER

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THOMAS GLOVER has great pleasure in informing Gas Companies and his other Patrons, that the *Jury of Class XXXI. of the International Exhibition of* 1862 have awarded, for his Patent Dry Gas-Meter, *a Prize Medal.* The reason given for this Award, in the Juries Official Report, is, *"For excellence of manufacture, as regards Dry Meters."* See Official Report, p. 346.

It is worthy of remark, that the only two other Firms who receive Awards *both manufacture imitations of Thomas Glover's* Patent Dry Gas-Meter, and the reason given for these Awards is *"construction* and sound workmanship." Thomas Glover, therefore, claims that the *construction* of his Meter has obtained *three Awards from the Jury of the International Exhibition of* 1862; at the same time, *contrasting* the Award granted for his Meter by the words, *"For excellence of manufacture, as regards Dry-Meters."*

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The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, April 16, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This JOURNAL has been duly registered at the General Post Office for transmission abroad.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 2, 1867.

Notes upon Passing Events.

ON no subject has constant discussion in and out of Parliament produced a more healthy effect—a more manifest improvement in the tone of public opinion—than that on the legislation relating to the education and employment of children. There was a good deal of party feeling in the majorities which carried the Acts for regulating labour in mines and in factories. The country gentlemen were not sorry to punish those whom they considered their natural enemies, while protecting feeble women and helpless infants. But these days of the struggle between Protectionists and Free Traders have passed away, and only linger round the dinner-tables of small squires in very benighted rural districts. There is no difference between the two great parties in the political world on the question of protecting the children of the poor from overhard labour, and of extending to them the blessings of an education that makes all the difference between savages and civilized beings. The manner in which Mr. Walpole's Bill for limiting the employment of children engaged in every kind of wages-earning employment was received by the House of Commons, reflects the highest credit on that assembly. All parties are evidently only anxious to save and protect the children, and they do not desire to punish any one. Of all employments those of the agricultural children are the most difficult to deal with. The difficulty is, however, being diminished by the steady, although slow, rise in wages, and consequent rise in the value of labour. Employers must pay for what they keenly want. When the problem was, how to employ the families tied to a parish, and when an agricultural labourer, work as hard as he would, could only earn a bare subsistence on the cheapest food, it was impossible to take from him the small assistance which he might obtain from wages earned by his children.

Although the condition of the agricultural labourer is far from what we should desire, it is, there can be no doubt, improving. Everywhere you hear farmers complain of the scarcity of good labourers; that alone will bring about not only higher wages, but the provision of those comforts in cottages and gardens and pigsties that agricultural labourers understand and will travel to seek, and, having found, will not willingly let go. Landlords will soon find that they can no more let farms to advantage without a sufficient number of cottages in convenient situations, than if the land was undrained and unprovided with feeding-yards and stables. Farmers, too, will have to learn that, whether they approve of pigsties and gardens and allotments or not, they must submit to them even at the chance of the labourer using some of his strength on his own ground, or borrowing some of his master's property to feed his own bacon. The time is fast approaching when the agricultural labourer who knows his business will be able to dictate his own terms. But it is, of course, difficult for the present generation of farmers to forget that in their day, or at any rate in their fathers days, the labourer was a pauper, employed, if not for charity, to diminish the tax of inevitable poor-rates. Landlords, too, have been taught, under the old poor-law system, that cottages were nests for breeding paupers, and although an alteration in the law has removed the legal discouragement to providing proper accommodation for the agricultural peasantry, it is always difficult to unlearn old lessons. Of course, it is hard for landlords to build who are short of ready money, but that is a difficulty which will be overcome, either by the ever extending system of land credit, or by the absorbing process under which rich men are continually becoming possessed of the landed property of poor men. In such cases a thorough improvement, with the view to an increased rental, is the very first step. We have lately seen an estate of £10,000 a year, in a ring fence and a good county, where no improvements had been done by the noble and impoverished landlords, father and son, within the memory of man. What the tenants did, they did at their own expense, and received a reduction of rent for their pay. Under such circumstances, draining of a complete character was out of the question; farm buildings were patched up with wood and thatch, and as for cottages, many tumbled down, but none were rebuilt. The time came, about three years ago, when the property passed into the hands of what the French call a "new rich man"—a millionaire—not at all remarkable for philanthropy or patriotic public spirit. But what on the best advice he did, to make the most of an estate which he had purchased at its full apparent value, was more advantageous to the farmers, the labourers, the county, and the country, than if he had been a model of benevolence and beneficence. He put the estate, which he treated as a machine, in the very best working order, drained and built new and extended old farm buildings, and, of all his investments, none seem likely to pay better than the cottages with which he provided each farm, in number according to the acreage, although they will not pay interest at the rate of 1 per cent.

The Earl of Leicester is one of the best stamp of landlords —generous and hospitable, but a thorough man of business, whose philanthropy is based on common sense, and not on foolish sentimental considerations. In a speech of his, quoted in the last report of the Children's Employment Commission, he puts in a very clear light the cottage question, on which any efforts to improve the moral and social position of agricultural children must be based. His lordship said: "It is in "my position of a landlord and a farmer that I address you. "Previous to the passing of the important measure of 1865, by "which the area of rating was extended, I thought it would be "desirable to provide houses for the labourers in the parishes "where they worked, although it was nearly certain that it "would increase the rates. Since the passing of that Act, the "advantage of such a course does not admit of a doubt. I am "the owner of 521 cottages, supplying about 450 able-bodied "labourers. I calculate that 950 are required to cultivate my "estate, thus leaving 500 to be obtained who do not live on "the estate. The home supply can always be depended on. "They have constant employment at wages which, owing to "piece-work (a system as beneficial to the labourer as profit-"able to the employer), are equal to 12s. a week, with a con-"siderable increase at corn and hay harvest. They live in "good houses, with hardly an exception, at an average rent of "£2 17s. 4d. per annum. These men will remain on the "estate. But the 500 who are required to properly cultivate "the estate have no certainty of constant employment. They "live in houses built on speculation, and have to pay £4 or £5 "a year for a meagre dwelling in which they cannot live "decently, and rarely have a garden. In many cases they "have to walk three or four miles to and from their work. . . "The only remedy for the great and increasing scarcity of "labour is to build as speedily as possible a sufficient number "of cottages for all the families required to cultivate the land. "I question whether existing rents can be maintained without "further cottage accommodation. My tenants are willing to "pay £5 per cent. on any sum I may expend in providing "homes for my labourers when they are required. *I am con-"vinced that the time is not far distant when the first require-"ments of a farm will be not ample farm sheds, but sufficient "cottages.*"

We may take it for granted that no attempts to educate, no attempts to limit the labour of agricultural children, will be thoroughly satisfactory until they can also be provided with decent, healthy homes. But, in the meantime, the evidence taken before the commission referred to thoroughly justifies the interference proposed by the Government Bill for extending the provisions of the Factory Acts to rural amongst other employments. Some of this evidence is of a very pathetic character. Tales of privation and suffering are hinted rather than told, which recall the saddest passages of the poet Crabbe's "Parish Tales." The popular and erroneous notions of rural innocence and purity are sadly dispelled by such evidence as that of the Rev. H. T. Fletcher, for eleven years a magistrate in the Fen district of Lincolnshire, who had previously been incumbent of a manufacturing parish in Lancashire. He says: "Comparing the children of the labouring classes with those "in the manufacturing districts, I should say their intelligence "is lower, that they are more prone to indecent language and "immoral practices. I could mention cases of early depravity "on the part of female children, of which I had no experience "whatever during 15 years residence amongst cotton-spinners. "Some of these cases may be traced to the employment of "young girls and boys in the fields—I mean children of 13 "and 14 years of age. But the insufficient sleeping accom-"modation is a prominent evil." Another witness says:— "The want of cottages is a great evil. I know instances "where the rooms in which four families sleep do not afford "150 cubic feet of air to each person." The requirements for a hospital are 800 cubic feet for each person. "I was "attending a child who died of typhoid fever. There were ten "other persons sleeping in the room with this child." Yet the same witness says: "I consider field-work decidedly healthy;" and that is the general tendency of the evidence. A labourer's wife in Huntingdonshire thinks differently, she says: "My "daughters, Harriet and Sarah, aged 11 and 13, were engaged "by a ganger. They worked for six weeks, walking to work "eight miles, and back again each day, beside working in the "fields from eight in the morning until half-past five in the "afternoon. They started from home at five, and seldom got "back before nine o'clock. They had 7d. a day, and had to "find their own meals and own tools, such as hoes. They "were worn out at the end of six weeks. I never heard of "the ganger ill-using them. He persuaded me to send my "little Susan, who was then only six years old. She walked "all the way, and worked from eight till half-past five, and "received 4d. She was that tired her sisters had to carry her "the best part of the way home—eight miles. She was ill "for three weeks, and never went again. The gangs use "dreadful language; they are not fit to be met on the road by "any respectable person. They will insult any one, swear, "and behave indecent." Elizabeth Dickson had a most pitiful tale to tell: "My husband left me a widow with eleven "children living out of fifteen, nine of them under sixteen "years old. The parish allowed me 3s. 6d. in money and "bread. My Henry was not eight years old; and when I "asked, 'What, will you turn him out?' they said, 'Well, "'he's big enough; he must help as well as others.' Jemima "was not two months over eight years old when she went out. "She said, 'Mother, I want some boots to go to school;' so "I sent her. She came home one day, when about 10½ years "old, from work amongst turnips, with her bones aching; the "doctor said it was a violent cold in her bones. She was "dead and buried in a fortnight. Children stooping down "get as wet at top as below. I have often been obliged to "take my flannel petticoat off, and roll it round a girl's legs, "and iron it with a warming-pan, to take off the pain "after being soaked all day, and let her go to sleep. I have "suffered very much from rheumatism, but that was partly "from doing washing at night and turning out with the gang "in the day; but I always considered a penny of my own "better than a thousand pounds to ask of a gentleman! I have "come home so exhausted that, when I found the door locked, "I have laid down until the key came." In Norfolk, a labourer's wife says: "This is the worst place for schools. "There are no work-day schools of any kind for the parish, "and, at the private school, 3d. is the lowest payment for any "child; but there are Sunday-schools. My eldest daughter, "now at service, can read and write; but she was always very "keen, *and learned partly from reading over the doors.*" Girls must do something. "As not half that want can get places, "they must go out to field work." This remark points to the insufficient education that the girls of labourers get. Crowded in cottages and not prepared for servants, if they go to school, they remain unemployed, at a time when the cry of the want of female servants is universal. The vicar of a parish in the marsh-land division of Norfolk says: "I fear the immorality, "and certainly the want of decency, amongst the agricultural "labouring classes, are owing to their homes and the want of "proper room. I have known a family of eight—consisting of "father, mother, three sons, and three daughters—living in one "room. Still, field work of any kind, especially in gangs, is "objectionable for girls or women. We have had cases of "assault by boys of 14 or 15 on girls, and other indecent con-"duct (to say nothing of filthy language), but not of late— "*not because of the infrequency of such behaviour, but because "little was thought of it,* and it was passed unnoticed. I be-"lieve the girls were generally as bad as the boys." With a volume of such evidence as the preceding, there can be no hesitation in putting the gang system under regulation, in abolishing mixed gangs of boys and girls, in compelling gang-masters to take out licences, and have a woman in charge wherever girls are employed. In time, we trust, better wages for men and the use of machinery will render children's labour unnecessary in every county, except where employed by the farmer who also employs the mother.

A volume, very handsomely bound and gilt, got up in Messrs. Longman's best style, is found either in the hands or on the tables of almost every member of the Corporation of London. This is a tribute of gratitude from Mr. Benjamin Scott, Chamberlain of the City of London, to his patrons and friends. Mr. Scott is an able man, or he would not have obtained or retained his post. Why he does not quote his City title on the title-page is difficult to understand, as he puts the letters "F.G.S.," which have nothing to do with anything statistical or commercial. The citizens sadly want an advocate, and they have all that zeal and no ordinary accomplishments can do in their chamberlain. As for the book, it has a fatal defect, in spite of the argumentative industry of the compiler. The "Statistical Vindication of the City of "London" is alike unquotable and unreadable. It is a collection of statistical truisms and dry arguments of a legal

character. No one doubts that the City of London is a very rich place, where there is a great deal of money, a great deal of valuable property, and a number of very rich men, at one time or other of the day. That does not require telling twice. No one whose opinion is worth anything disputes these facts; and when Mr. Haywood, in his report, which was quoted in almost every London newspaper, proved that the statistics of population should be taken by day and not by night, all that was worth saying had been said. Mr. Scott wastes his time, except as regards his constituents, the Common Council, when he goes into elaborate figures to prove that Sir Richard Mayne made a ridiculous mistake in his calculations of the amount of crime in the City and in the cost of the City police. As to Mr. Edwin Chadwick, his habit of getting hold of a witness that suits him and lauding him to the skies is notorious. Of Mr. Chadwick it may emphatically be said, with Sheridan, "that nothing is so untrustworthy as "his figures, except his facts." We are quite willing to believe the chamberlain's calculations and conclusions showing that a City policeman, who is a much finer man, only costs 10s. 3d. more than one of the "myrmidons" of Sir Richard Mayne. The charge which intelligent public opinion brings against the Corporation of the City of London is, that it is a vast, cumbrous, noisy, expensive machine, which does as little as possible as slowly as possible and as badly as possible, of the greater part of the work which it is maintained to do. Deducting the discussions—carried on in most cumbrous forms—the printing, and the feeding, the residuum of useful work is exceedingly small. Now this serious charge will not be met by such an official as Mr. Scott picking holes in Sir Richard Mayne's statistics, or saying to the Metropolitan Board, "You're another." In the City of London a very small constituency elect an enormous number of persons to do a very little real work. The Corporation of London was an important political institution. Its discussions, at one time, had an important influence in forming public opinion. The men who formed the Corporation were men of weight and influence in the State, and newspapers were few and little read. All that is past, and it is now notorious that any fluent person who makes himself noisy and busy in certain wards, *and who carefully dines* with and entertains certain persons, will infallibly be elected to the Common Council on the first vacancy. Common Councilmen often talk as if they fancied they were Members of Parliament; but they are not. The business of a Parliament is not only to make laws, but, by discussion, to form public opinion. The business of the Corporation of London is to manage the municipal affairs—to see that the City is well paved, well lighted, well supplied with water, that old streets are kept in repair, that new streets and new bridges are constructed when required, to promote education amongst all the classes under its charge, and, occasionally—although Mr. Scott evidently considers this the principal duty—to entertain great princes and foreign potentates. It is mere claptrap to assume that those who criticize the Corporation of London wish to strike a blow at local self-government, to abolish the Lord Mayor, and put paid commissioners in the place of a common council. No reformer of any importance desires anything of the kind. But there are a great many social politicians who would like to see the Corporation recast and remodelled into a working machine, just as the old models were not followed when London and Blackfriars Bridges were pulled down, but the latest designs of modern science were adopted, and comfort and convenience studied as well as design. The reputation and influence of the Corporation has declined, not only because blatant speech-makers of no position and doubtful character occupy so much space in all their discussions, but because, for the last half century, they have done so little and spent so much. Five-and-twenty years ago the Corporation of London would have been hailed with gratitude if it would have undertaken any one of the works now in the hands of the Metropolitan Board. But it is notorious that until the Metropolitan Board was founded the Corporation was as full of objections as an egg is full of meat to doing anything except giving a banquet. Middle-aged men remember the beginning of the improvement in continuation of Farringdon Street, which is still a wilderness, in spite of the Metropolitan Railway. The Metropolitan Cattle Market was forced on the unwilling Corporation by the threat of a commission to execute it, over which the late Sir John Shelley was to have presided. That Cattle Market was and is a monument of the incapacity of the City to do a good and great thing, even with unlimited funds. Mr. Scott declares that the Corporation was only prevented from embanking the Thames by a decision which gave the foreshores to the Crown, and he refers to the report in the archives of the Corporation. Why, if the Common Council had acted on its reports it would have been the most active and enterprising municipality in the world. But committees and reports with discussions thereon are the bane of Corporation business. Reports have been prepared enough to thatch all London, and there, with good intentions, City business generally ends. The City never wanted to embank the Thames, never made a single step towards obtaining parliamentary powers for that purpose, or ever thought of undertaking any business *out of City bounds*.

Public bodies, like individuals, who desire to retain power and reputation, must live by what they do, not by what they say. The City has done well in its sewerage and sanitary arrangements. It is doing well, although tardily, by the Holborn Valley improvements. It did well by subscribing to the Underground Railway. As for the other improvements, included in a list in every Common Councilmen's pocket-book, with the exception of that enormous job, London Bridge, they are for the most part below contempt. If the Corporation wishes to regain power and influence, it must go on doing and offering to do great things. If it only talks, it will be suffered to exist, and nothing more. Recent instances may be found of the low tone of the Common Council. A few weeks ago, an attempt to purchase, with Corporation funds, a worthless portrait-picture of aldermen and Common Councilmen for £5000, was only defeated after two long debates. The report of a committee was supported by a minority, respectable in number at any rate. Last week, a proposal to establish a free library, at a cost of only £25,000, for a city full of apprentices and shopmen, was rejected with ease by a large majority. Now, let us look to the other side of the world. Five-and-twenty years ago the city of Melbourne consisted of a few huts and tents. At the present moment, beside many other magnificent institutions, its inhabitants enjoy the use of a free library complete in books, well provided with maps and specimens of engravings. Into this library any working man may enter and find every convenience for washing, and attendants to bring him any books he may desire to read or drawings he may wish to copy. Had the Common Council decided to found a free and lending library for the use of the population which forms the boast of the statistical paragraphs of Mr. Chamberlain Scott's brief, there would have been a fact more useful in maintaining the City's claims to power and influence than pages of clap-trap about "trembling for the liberty of the "press," and "witnessing with apprehension the tunic and "helmet superseding the civil hat and dress of Sir Robert "Peel!" (*sic.*)

The strike of the Brighton Railway engine-men and its result presents an example of the use of a union and a strike to the public as well on the men concerned. It is a complete contrast to the carpenters, the bricklayers, and the iron-shipbuilders. Messrs. Odgers and Cremer, carpenters by education and agitating reformers by trade, if they could succeed, would make the rise from the ranks of carpenters almost impossible, and the ruin of all builders without a fortune, independent of trade, certain. The engine-drivers stood on different ground. They asked for wages not unreasonable for such work, and for a limit in time which could not fairly be counted on an average of the week. It was no comfort to a man, working twenty-four hours at a stretch, to find he had only worked sixty hours in the week. The officials knew where the shoe pinched, but dare not report to a committee of directors, who were pledged to economy to the shareholders. The strike relieved directors and officials of all responsibility.

METROPOLIS GAS CONFISCATION BILL.

THE Conservative Government, in their Bill for the amendment of the Metropolis Gas Act of 1860, propose to deal with the property of the gas companies with a liberal disregard to the rights of the owners equal to that of a democracy of freebooters. There is, however, a barefaced boldness in the demand that the gas companies should surrender three-tenths of what they possess, which commands respect from its daring and simplicity. There is no attempt at reasoning—there are no excuses nor apologies—none even of the

courtesies with which the free-traders of Hounslow Heath prefaced their applications: it is the plain, simple, unadorned "Stand and deliver!" The only difference between the two cases consists in this: The Government demand the plunder for the alleged benefit of the public, not for themselves. But whatever be the motive, the effect would be equally injurious to those who are robbed, and the consequences would be more generally disastrous by destroying confidence in the security of all property invested on the faith of Parliament.

It might have been assumed that on the introduction of a Bill for essentially altering the provisions of a well-considered Act of Parliament but recently passed, some cause would have been assigned why such alterations had been rendered necessary; but the preamble contains no allegation that the Act of 1860 has failed to fulfil its objects, or that it has worked in any way unsatisfactorily. Without any introductory remarks the preamble merely states—"Whereas it is expedient that "such provisions as are in this Act expressed be made for "amending the Metropolis Gas Act, 1860." It is solely, therefore, on the ground of general expediency, and from no other assigned cause, that the 34th section of the Act provides that the dividends of all the metropolitan gas companies shall be limited to 7 per cent. instead of 10 per cent., which they are now authorized to receive, and which most of the companies actually divide.

To understand the full import of such a proposition, and what would be its probable effect, if carried, on all public securities, it should be borne in mind that the right of the metropolis gas companies to share 10 per cent. dividends on their original capitals has been secured to them by several public and private Acts of Parliament as firmly and unconditionally as it is possible for any property in this country to be. In the first place, the General Act passed in 1847, called the Gas-Works Clauses Act, authorized all the gas companies in the kingdom to divide among their shareholders 10 per cent. on their paid-up capitals. That General Act was incorporated in the private Acts of many of the metropolitan companies, and by the Metropolis Gas Act of 1860 they were all brought within its provisions. For several years past the profits of most of the companies have enabled them to divide among their shareholders the full amount of 10 per cent., and to make a large reduction in the price of gas. Whether, however, they received that amount or not, their right to receive it, if the profits of the company allowed, was as unquestionable as the right to recover stated rents, or dividends of any kind; for the right to all property depends more or less on the faith of Parliament. The Government, though professing to be conservative, now purpose to induce the House of Commons to break faith with the gas companies, by reducing their authorized dividends to 7 per cent., which would practically be to rob them of two-thirds of their property; the sole reason assigned for such a flagrant spoliation being that "it is expedient." If that be deemed sufficient to justify the breach of faith by Parliament with the gas companies, there is no other case to which it might not be applied, and even the holders of Three per Cent. Consolidated Stock might some day find that the Government deemed it "expedient" to reduce their dividends to 2 per cent. There would not be a single jot more injustice in that case than in mulcting the gas companies of 30 per cent. of their dividends.

If the House of Commons were to sanction, by the second reading of the Bill, the dishonest principle involved in the 34th section, there can be little doubt that it would inflict a serious blow on the national credit, for it would be equivalent to a declaration that obligations contracted at a period of difficulty and danger may be repudiated in times of prosperity and peace. No less than such a repudiation is proposed in the reduction of the dividends of the old shareholders of gas companies. The prospect of 10 per cent. interest was presented by Parliament to induce the investment of capital in the extension of gas lighting, at a time when such undertakings as gas undertakings were considered hazardous speculations. Of late years confidence in the security of such property has increased, and the dividends on the new capital invested in such concerns have been limited in consequence to 7 per cent. But the claims of the old shareholders are surely not invalidated because improved circumstances have permitted them to realize their promised dividends. They have borne the heat, the burthen, and the danger of the day, and now that the battle is won they are to be despoiled of their well-earned, promised rewards.

There is, as we have said, a barefaced daring in the manner in which the Government call on the gas companies to surrender their property, which commands some kind of respect. But the same cannot be said of the insidious means whereby it is proposed to plunder them, by enforcing a supply of gas on terms and under conditions which would render it impossible to maintain the existing rate of dividends. The Metropolis Gas Act empowered the gas companies to charge 4s. 6d. per 1000 feet for gas possessing an illuminating power equal to 12 sperm candles, and provision was made, in case increase in the cost of coals or labour prevented them from making a profit of 10 per cent. at that price, to increase the charge. But in the Metropolis Gas Confiscation Bill it is proposed to prohibit, under any circumstances, a higher charge than 3s. per 1000 feet for the same quality of gas, though, at the present time, the profits of the companies will barely enable them to maintain their prescribed dividends. Thus while, on the one hand, there is the bold-faced demand on the gas companies to stand and deliver, it is, on the other hand, proposed to abstract from them surreptitiously more than the amount they would be openly robbed of. In this second part of the scheme the novelty is introduced of varying the price of gas according to its purity and illuminating power, so that neither the gas companies nor the gas consumers would know, until some time after each quarter, what was the actual price chargeable. On this part of the project, however, we need not dwell, for it is so manifestly impracticable, that it would be quickly disposed of if the Bill should have the chance of being submitted to a select committee. The fancy standards of purity and illuminating power would soon vanish, and the plurality of prices for gas would certainly be consigned to the same limbo as the dual votes for Members of Parliament.

After the great care apparently taken by the Board of Trade to obtain ample information on the supply of gas to the metropolis, and to ascertain the opinions of various bodies on the amendments supposed to be required in the Metropolis Gas Act, there was good reason to hope that the result of the long period of gestation would have been the bringing forth of a well-matured measure for the final and satisfactory settlement of the question, founded on equitable principles. But instead thereof has been produced an iniquitous abortion, a disgrace to its parents, which threatens, if it live, to destroy the last shred of conservatism, which it has hitherto been their profession to support. The metropolitan gas companies, we understand, are making vigorous efforts to strangle this miserable abortion before it draws another breath, and to prevent, if possible, the second reading of the Bill. We have little doubt they will be strenuously supported by all who have regard to the rights of property invested on the faith of Parliament, and we sincerely trust they will succeed in preventing the sanction by the House of Commons of an act of spoliation which has no precedent in modern legislation.

Circular to Gas Companies.

THE Metropolis Gas Act Amendment Bill was not issued until the 22nd ult., just one month after the House of Commons had ordered it to be printed, and instead of the considerately prepared measure that was anticipated after such great delay, a more unjust and impracticable one it is scarcely possible to conceive. We have elsewhere commented on the flagrant breach of faith proposed by the reduction, without any assigned cause beyond its expediency, of the parliamentary dividends of the metropolitan gas companies, and the correspondingly unjust reduction of the price of gas and increase of the standard of illuminating power. If such a mode of dealing with property secured by numerous Acts of Parliament were sanctioned by the Legislature, this country would be in danger of sinking to the low level of Spain, Mexico, and other repudiating states, in reputation for disregard to solemnly contracted engagements; and it is considered most important, therefore, to resist the further progress of the Bill. The second reading was appointed for last night, but, in consideration of the important interests involved, the motion was deferred, and cannot now come before the House earlier than Thursday next. We earnestly entreat all gas companies to petition against the confiscating clauses of the Bill, and to urge the Members of Parliament for their respective constituencies to reject it on the second reading, unless those clauses are abandoned or satisfactorily modified.

The brief preamble of the Bill, without any allegation

against the Metropolis Gas Act, or the manner in which it has been carried into operation, merely asserts that "it is "expedient" the Act should be amended. With equally curt treatment 19 important sections of that Act are lumped together in a schedule, without explanation, and repealed. The sections thus summarily disposed of comprise the one which incorporates the Gas-Works Clauses Act, 1847, and all the sections relating to the illuminating power, the purity, and the price of gas. The Bill then proceeds to provide for carrying out in detail the recommendation of the gas companies, to the parliamentary committee of last session, for the constitution of a Board of scientific and experienced men, for the determination of questions of purity and illuminating power; but, in attempting to carry out that recommendation, the Bill departs greatly from the principles on which it was founded. It is proposed that a Metropolitan Gas Board be constituted, consisting of three competent and impartial persons of scientific knowledge and experience, to be appointed by the President of the Board of Trade, who are to prescribe the mode of testing gas, to investigate the processes of manufacture, and the means adopted at the gas-works for purification; to prescribe the maximum amount of impurity in each form with which the gas shall be allowed to be charged—it being provided that it shall be wholly free from sulphuretted hydrogen; and they are to prescribe the number of testing-places and the apparatus to be employed. In addition to the Metropolitan Gas Board there is to be a chief gas examiner, also appointed by the President of the Board of Trade, whose duty is to be to superintend the gas examiners at each testing-place, who are to be appointed by the Metropolitan Board of Works, and to decide in cases of dispute between them and the gas companies. The testings of illuminating power are to be made at least three times each day, and the average of all the testings on each day is to be deemed to represent the illuminating power on that day. There is to be no fixed maximum price for gas, but it is provided that it shall vary according to the illuminating power and purity, as follows:—For gas of an illuminating power equal to 14 candles, the maximum price chargeable to be 3s. 6d. per 1000 feet; for every increase of illuminating power equal to one candle above 14, the price may be increased 3d. per candle; and for any reduction below 14 candles, the price is to be reduced in the same proportion. Again, if the amount of impurity in the gas exceed, in any degree, the prescribed quantity, the price chargeable is to be reduced 1d. per 1000 feet; if the amount of impurity exceed one-third the prescribed quantity, the price of gas is to be reduced 2d. per 1000 feet; and should it exceed the standard one-half, the reduction is to be 3d. per 1000 feet. It is to be the business of the chief gas examiner to determine, by examination of the averages of testings, the maximum price chargeable for each quarter. The section relating to the limitation of dividends is, perhaps, even more remarkable than the provisions as to the maximum price of gas, and to avoid misapprehension we insert it as printed in the Bill.

34. Each company may pay a dividend for each half year in proportion to the illuminating power of the gas supplied by them in the quarters comprised in that half year, and to the price charged by them for the same, as follows:—

For each half year in any part of which the price charged is the maximum price chargeable according to the prescribed scale of illuminating power and price, a dividend may be paid at a rate not exceeding seven per centum per annum.

For each half year throughout which the price charged is less by one penny per one thousand cubic feet than the maximum price chargeable according to that scale, and so in respect of each further reduction of price by one penny per one thousand cubic feet below the maximum price chargeable according to that scale, a dividend may be paid at a rate (in addition to the dividend at the rate of seven per centum per annum) not exceeding one half per centum per annum:

Provided always, that where the illuminating power is less than that of twelve candles there shall be no increase of dividend for any reduction of price below the maximum price chargeable according to the prescribed scale of illuminating power and price.

An auditor is to be appointed by the President of the Board of Trade for the investigation of the accounts of the gas companies. The pressure of gas is to be maintained at 1 inch at the exit of the meters, governors are to be affixed to all the street-lamps, and the price to be charged for public lighting is not to exceed the lowest price charged to any local authority or private consumer. The remuneration of the members of the Gas Board and of the chief examiner and auditor is to be determined by the Board of Trade, and the expense is to be apportioned among the gas companies. The remuneration and expenses of the gas examiners are to be paid by the Metropolitan Board of Works or the Commissioners of Sewers. With respect to the purchase of the undertakings of the gas companies, section 49 of the Bill provides—"That the Metropolitan Board of Works, "or the Commissioners of Sewers, may from time to time "enter into and execute such agreement as they think fit for "the purchase by the Metropolitan Board of Works or the "Commissioners of Sewers of the undertakings of any com-"pany." There is also a clause for rendering the gas companies subject to the provisions of any future General Act, and to any revision of the maximum prices and dividends. All the costs of the Act are to be borne by the Metropolitan Board of Works. The powers proposed to be given to the "Gas Board" are unlimited, and considering its probable constitution, no gas company could feel safe under the control of such a body. Chemists are notoriously unpractical, as experience has repeatedly proved, and unless some practical blood be infused into the Board, the consequences of their unrestricted power to determine the amount of sulphur to be tolerated, and the modes of testing the purity and the illuminating power of the gas, might be disastrous. The limitation of the members of the Board to three, two of whom may be a quorum, is also very unsatisfactory. To render the administration of such a Board impartial, and to inspire confidence in its decisions, it should consist of at least five members, two of whom should be appointed and paid by the gas companies, the others being nominated and paid by the Government, or by public bodies. To the provisions of the Bill for testing the gas there is less objection, and as it is proposed that the examiners should be paid by the Metropolitan Board of Works, or the Commissioners of Sewers, the companies would have some guarantee against the creation of places merely for the sake of patronage. With respect to the auditor the case is different. The powers proposed to be given to him are very extensive, inasmuch as, "if he finds the accounts incorrect in principle or in "detail, he shall require the company to correct the same in "such manner as he thinks right," subject to an appeal to arbitration. Unless, therefore, he were paid by a fixed salary, there would be ample temptation to him to be vexatiously officious. On the principal question of the maximum price and quality of the gas there is great variety of opinion, as is evident from the long correspondence on the subject which has been printed by order of the House. The absurdity of a sliding scale of prices, which it was rumoured had been abandoned, remains conspicuously as a leading feature of the Bill. Should the fantastical proposition to determine the price of gas by its average purity and illuminating power have the chance of being adopted, it would give rise to the most perplexing confusion, and would throw an overwhelming amount of work on the chief examiner. The penalty to be imposed by the reduction of the price of gas 1d. per 1000 feet when the amount of impurity over any three successive days exceeded the quantity allowed, would be equivalent in the case of the larger gas companies to a fine of several thousand pounds a quarter. These penalties would be absolute, with no power to mitigate them, even though the impurity should arise from causes altogether beyond control. The section of the Bill respecting dividends has apparently been concocted by some one who was ignorant of the fact that many of the Metropolitan Gas Companies have different classes of shares, with various authorized dividends. On the holders of new shares the proposed limitation of dividends to 7 per cent. would be inoperative, for that is their present limitation; and the spoliation would be for the most part confined to the holders of old shares. The proposition to permit the division of an additional half per cent. for each reduction of 1d. per 1000 feet in the price of gas is a mockery, at the low maximum prices named. At those prices it would be almost impossible for the companies to realize profits sufficient to divide the prescribed 7 per cent. among their shareholders. If it be desired to stimulate the gas companies to reduce the price of gas by making it their interest to do so, the principle which has been practised unsuccessfully in other cases should be adopted, of allowing a higher rate of the present dividends on new capital, proportionate to the reduction in the charge for gas from reasonable maximum prices. We cannot conclude these remarks on the Bill without congratulating the suburban gas companies on having been excluded from its provisions.

The result of the past six months experience of the Brighton and Hove General Gas Company in the supply of 14 candle gas at 3s. 6d. per 1000 feet is not very promising. From the balance-sheet of the company it appears that on a gas-rental of £14,319, the working expenses were £11,460, or 80·33 per

cent. on the rental, leaving only £2859 for dividend and interest on a share and loan capital of £128,520, or at the rate of nearly 4½ per cent. per annum; but it has been made up to 5 per cent. out of a balance of undivided profits of previous years. This is a state of affairs which seriously affects the ability of the company to raise further capital, and it appears that only £2520 out of the £20,000 of new capital authorized to be raised has been taken up; one-half of the amount having been offered to the shareholders, and half to the public, by auction, in November last. The directors make a somewhat piteous address to the shareholders, assuring them that the strictest economy has been observed, in furtherance of which they have relinquished one-fourth of the amount of their remuneration. We regret to perceive, from a paragraph in the report, that a very hostile feeling has arisen between the two existing companies, which cannot fail to be prejudicial to the interests of the shareholders of both. This is the more to be regretted as the two companies must ultimately amalgamate, unless, indeed, the shareholders participate in the pugnacious feelings of the directors, and are satisfied with the moderate dividend declared. The moribund Aldrington and Brighton Gas Company have given no signs of life since their last general meeting, and it is more than ever probable, since the result of the last half-year's operations of the Brighton and Hove Company has been made known, that their Act of last session will remain a dead letter from want of means to give it vitality.

With the exception of a feeble opposition to the Cambridge Gas Bill, the other gas Bills in Parliament are passing quietly unopposed through their various stages. Gas companies, as well as local authorities, have gained wisdom from past experience, and are more disposed to make mutual concessions than they were in years past. The opponents of the Cambridge Company sought to deprive them of the power to pay back dividends, to which they are entitled by their present Act; to this proposition, however, the Court of Referees would not listen. The only point carried by the opponents of the Bill was that the gas should be tested at the town-hall instead of at the works, as proposed in the Bill, and even that point was conceded by the company voluntarily.

The Town Council and Local Board of Reading cannot admit themselves to be in error with a good grace. At their meeting on the 21st ult., a report from the Public Lamps Committee was presented, in which it was recommended that the claim of the gas company for payment of the gas supplied to the public lamps by average meter indication should be no longer resisted, but the terms in which that concession was made show no friendly spirit to the company. The recommendation was accompanied by the assertion of the right of the Board to demand from the company a regulated supply of gas to each lamp at the rate of 3½ feet per hour, and that they would not pay for more. That is equivalent to abandoning the plan of average meter indication; but as the Board adjusts the burners and lights, and extinguishes the lamps, they would, if such a proposition were agreed to, be in a position to help themselves to as much gas as they desired at a fixed price. In the discussion of the report, the town-clerk, who has taken a prominent part against the gas company, in a most unseemly manner endeavoured to prevent some of the directors, who are members of the Board, from speaking. Though the average meter system has failed to give satisfaction at Reading, the local authorities seem unwilling to return to the contract system, unless they have the supply entirely under their own control.

Communicated Article.

ON DEFECTS IN THE APPARATUS GENERALLY USED FOR THE DETERMINATION OF BISULPHIDE OF CARBON IN COAL GAS, AND DESCRIPTION OF A NEW APPARATUS FOR ITS ESTIMATION.

By Alfred G. Anderson, Esq.,
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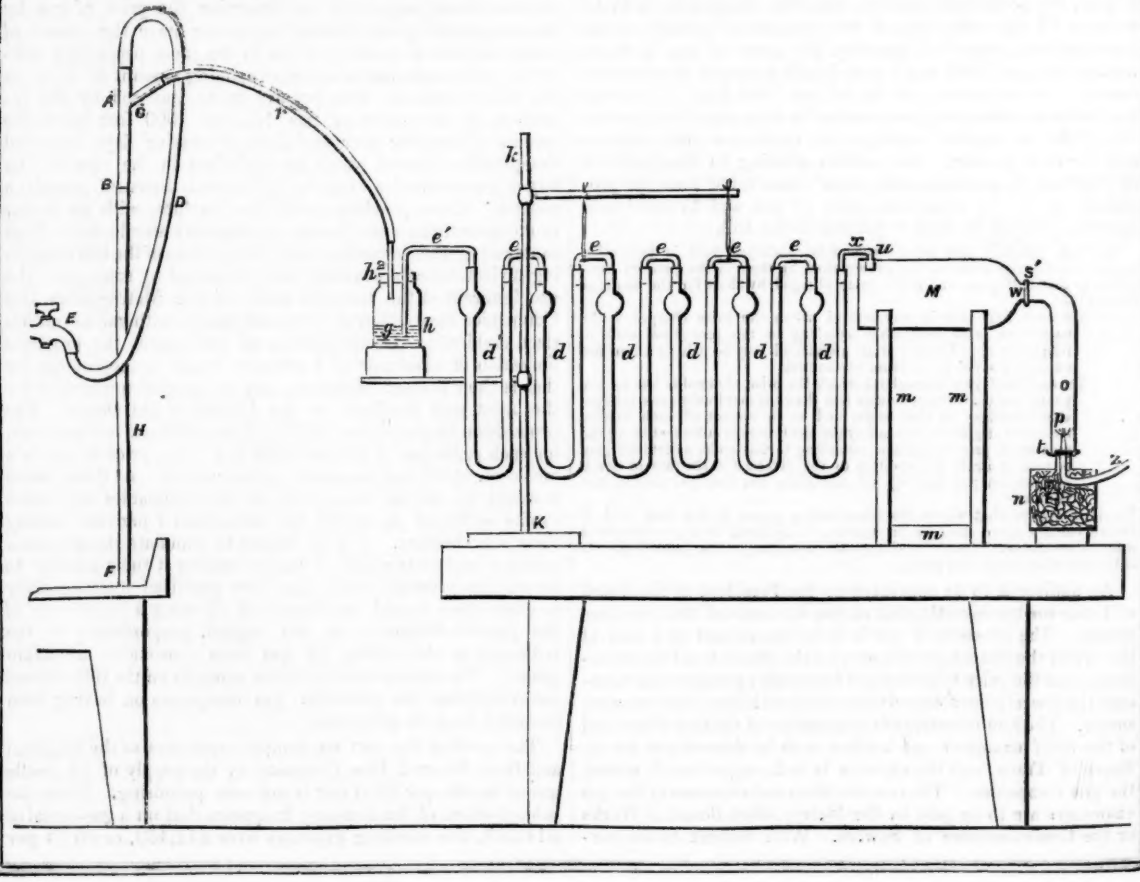
(*Continued from page* 819, *vol.* xv.)

I now proceed to deal with the question of the method which must be adopted to effectually arrest all the sulphurous products from the combustion of the gas burned inside the trumpet-tube. I have, for this purpose, arranged an addition to the usually employed apparatus, which we shall see completely effects this end.

It is first necessary to refer to the annexed drawing:—



M shows the large glass receiver, into which the trumpet-tube is fitted at W *s*, supported at a suitable height by the holder *m m m*; *z* is the pipe connected with the measured bulk of gas to be burned by the jet *p*, under the trumpet-tube *o*; *t* is the glass gutter of the "desulphurizing" vessel, which, with its pumice fragments, is further shown at *n*. The outlet *u* of the receiver condenser, instead of being associated with a second one, as drawn at page 658, vol. xiv. (L), is, by the tube bent at right angles, *x*, joined to the series of six U-tubes, *d' d d d d d*. These are likewise connected, at *e e e e e*, by glass tubes bent at right angles, passed through bored, sound, well-fitting corks. The employment of junction-tubes of vulcanized india-rubber is, of course, in this case quite inadmissible. The bottle *g* is of the wide-mouth form, attached to the last U-tube, *d'*, by the right-angled tube *e'*, inserted through the double perforated cork *h*, passing nearly to the bottom of it. In the second perforation of this cork, a short piece of glass tube, *q*, it will be observed, is fitted, the lower extremity of which only just emerges through the under side of the cork *h*. Its function is to make a junction from the tube *q* to the orifice *c* of the apparatus A B C, an elegant form of "aspirator," the office of which must now be described.

It consists of a small tube, generally made of brass or copper, open at both ends, and provided with a somewhat narrower tube let into its side, as represented in the drawing at C. The upper opening, A, is connected, by the vulcanized india-rubber tube, D, with the water-supply tap, E, over the sink, F; B, the lower outlet, is joined in a like manner to a glass tube, H, hanging perpendicularly from it over this sink. When the water-tap, E, is partially turned on (not fully, but with much care, or the water, rushing with full force into the tube, would escape both from the lower opening B and the lateral opening C), a very uniform and abundant easily controlled current of air is continuously drawn in at C, and divided into single bubbles, which are carried down with the water through the opening B, and finally pass away with it to the sink by the glass tube H. The air is thus drawn in by the suspended suction-column in this tube, and its volume to a certain extent proportional to its length.*

The size of the "aspirator" I have found convenient for use is as follows:—The tube A B is about 1 foot in length and $\frac{3}{8}$ of an inch internal diameter. The tube fastened into the side has an internal diameter of $\frac{1}{4}$ of an inch. The six U-tubes are 18 inches long, with an internal diameter of $\frac{1}{4}$ an inch, and they are each provided with a bulb blown in one limb 3 inches below the top. It is important that this enlargement into bulbs at the part mentioned be observed, as will presently be evident. The object to be attained is, that all sulphurous fumes which have not been retained by the ammonia in the large receiver M, shall be drawn for complete absorption through a solution of potassa or ammonia, placed in each of these tubes, by the action of the "aspirator." I have said that, when a carefully adjusted supply of water is conveyed from the water-supply tap, E, to the upper opening, A, of the "aspirator," that air is continually sucked in through the orifice C: a fluid ounce of solution of potassa, or solution of strong ammonia, is a suitable quantity with which to charge each tube. When the apparatus is put together in the way shown in the drawing—the stand, K K, with its arms, being very useful for supporting the U-tubes in a steady position—in order to draw air steadily and continuously through the pumice of the "desulphurizing" vessel, up the trumpet-tube, through the condenser M, and then through the fluid of the six tubes and bottle *g*—yet with a velocity sufficient to supply atmospheric air in quantity adequate to maintain the perfect combustion of the gas by the jet *p*—it is simply necessary to join the tube *q* with C by the flexible pipe *r*, and adjust the supply of water to the "aspirator" by the tap E, until the desired rate of transmission of air be arrived at.

With the U-tubes containing the proportion of liquid named, it is necessary that the tube to contain the falling suction-column of water, H, be provided with a total length of at least 8 feet, otherwise the required rate of inflow of air cannot be properly controlled, or rendered at all times sufficiently rapid. I find it convenient, in order to possess the sink at command for getting rid of the water running away from the "aspirator," to raise this "aspirator" near the ceiling of the room. The drawing explains that this may readily be accomplished by leading a flexible tube from the water-tap, E, to the upper inlet of the "aspirator," when secured in its elevated position by fastening it to one or two nails driven into the wall of the room.

It is essential, if we would thoroughly wash the mixture of atmospheric air and unremoved sulphurous fumes by the potassa or ammonia in the U-tubes, that the "aspirator" be worked so as to maintain the alkaline solution of these in a condition of brisk agitation. Now the potassa or ammonia, from absorption of carbonic acid produced by the combustion of the gas, after a while becomes more or less changed into carbonates. The result of this is, that the solutions in the U-tubes, having worked very satisfactorily for some time after the commencement of the experiment, subsequently froth and foam in a very unpleasant manner. Rings of liquid rush up the limbs of the tubes nearest the "aspirator"—those limbs, in which by the force of the current of air the level of the fluid is raised and supported in constant agitation. If we have not adopted the precaution of setting bulbs blown in the upper part of the limbs of the U-tube in which this action continues, the rings of fluid break constantly against the cork junctions, saturating them in an embarrassing manner with portions of the solution, which it is so essential for the success of the analysis should at the termination of this operation be capable of entire removal without loss from the U-tubes. Then, again, as these rings break when they reach the cork, some of the liquid is inevitably drawn into the small tubes of connexion, *e e e*. This is a serious occurrence, for in no great lapse of time the liquid in the tube next but one to the large receiver M becomes greatly augmented in bulk by the small portions of fluid of the tube placed between it and this receiver, which have been in this manner carried over from it into tube No. 2.

The force of the current of air soon carries the excess of fluid which has thus accumulated in No. 2 U-tube into No. 3; then into No. 4, and so on, until, by traversing successively from one tube to another, it finally collects in the bottle *g*. If this last vessel be provided of considerable capacity (and this should on no account be overlooked), it will safely retain any of the fluid of the U-tubes which from any cause may be carried over in this way. It is always advisable to place a bottle, fitted up as described, to intervene between the U-tubes and the "aspirator," as sketched in the drawing, notwithstanding that we have not omitted to observe that every one of the U-tubes has been furnished with the bulbs blown in them, which, in my experience, I always find effectual in preventing the contact of the enclosed solution with the corks, even when very brisk agitation of it occurs. The addition of this bottle, *g*, is a sure safeguard against the possibility of loss being incurred, if, from some want of caution in putting the "aspirator" into action, a sudden rush of air through the tubes forces portions of liquid with it into the last U-tube, *d'*, until it becomes filled, or nearly so. Then, but for the bottle *g* occupying its position in the arrangement (in which so long as the lower extremity of the short tube *q* remains out of reach of contact of the liquid carried over into it every drop of fluid collecting there will be securely held), the experiment would be completely spoiled from the loss arising by the passage of some of the alkaline solution, with its condensed sulphurous products, through the tubes *r* and H into the sink.

I am thus careful in describing the precautions it is absolutely necessary should be observed to avoid a useless expenditure of time and trouble by others, who, with a view to estimate sulphur in this manner, may put this system into operation, from the fact that in my first one or two attempts to apply it, I experienced a good deal of vexation through accidents arising from non-observance of the small details which I have here taken some pains to point out. If we would entirely avoid the mortification of failure, we must pay strict attention to setting up the apparatus with the safeguards I have particularized.

If potassa solution be the absorbing fluid selected for charging the tubes, in preference to ammonia—and in my earliest experiments I uniformly employed it for this purpose—as potassa which is usually kept in laboratories nearly always contain more or less sulphuric acid, one of two courses must be adopted in this case: we must either purify the solution of potassa in a way that will enable us to be completely rid of this sulphuric acid, or, what is far more convenient, prepare a few pints of the unpurified potassa solution, then take a weighed quantity of this, and pass a current of chlorine into it until no more of that gas is absorbed; boil for a few minutes, after feebly acidifying with a few drops of hydrochloric acid; filter; add sufficient solution of chloride of barium to throw down all the sulphuric acid; filter after allowing twenty-four hours for subsidence; wash dry, ignite, and weigh the precipitate thus obtained.

It is only then necessary that the potassa solution be weighed before being placed in the U-tubes. A flask is, therefore, selected which will about hold the necessary quantity of the potassa solution adequate for this purpose, and it is, with its contents, then exactly counterpoised in the balance. When the operator has poured from it as much of the alkaline fluid as the tubes require, weights are placed upon the balance-pan until this loss of weight is made up by adding weights, which necessarily represent the true quantity of potassa solution taken to absorb the sulphurous vapours. The proportion of sulphuric acid existing in the assay of the first-weighed bulk having been ascertained, the quantity of this acid present in any second-weighed amount is, of course, then readily known by a simple rule-of-three calculation.

The experiments which follow explain how this allowance for sulphuric acid present in the potassa solution assay is easily arrived at. One-half of the bulk of gas taken to compare the results obtained by burning equal volumes of a selected sample of gas was first burned inside the "desulphurizing" vessel with the "single" jet. The arrangements of the apparatus in this case were made with every possible precaution, so as to ensure estimation of the highest amount of sulphur which could be attained by this method of proceeding; that is to say, two receivers, in which the maximum allowance of ammonia was contained, were employed for the condensation of the sulphurous products of the combustion. Six hours were occupied by this combustion, and great attention was

* Mr. M. W. Johnson, who, 16 years ago, devised this ingenious "aspirator," states that, when this suction-column of water is allowed to run down it into a 25 feet length of tubing, air may be forced or drawn through a column of water 6 feet in height.

given that the gas should burn steadily and as perfectly as could be accomplished; and in order that the gas should be consumed in an atmosphere containing much ammoniacal vapour, plenty of strong ammonia was continuously supplied to the gutter of the "desulphurizing" vessel, in place of that portion which, as it became reduced in strength by volatilization of its ammonia gas, was from time to time removed by a syphon. The weight of the sulphate of barium obtained in this instance was 1·63 grains.

The second equal half bulk of the gas was put to burn immediately the operation of consuming the first portion had terminated in connexion with the tube apparatus depicted in the drawing, Fig. 4. Into the receiver M, the same measure of ammonia as that which had been divided between the two receivers in the experiment just described, was poured before it was connected to the series of U-tubes. Then a flask, which would contain about 1500 grains of potassa solution, of specific gravity 1·27, was counterpoised upon the balance. As this flask was provided with a lipped mouth, well adapted for pouring from it without loss, no difficulty was experienced in conveying the requisite quantity of potassa solution out of it into the U-tubes. When this had been done, the flask was again placed upon the balance-pan, and the proportion added to the U-tubes ascertained by again weighing the flask. Beneath is the statement of the weight of the solution poured into the tubes:—

The flask and potassa weighed	1436·81 grains.
After the removal of the potassa	297·60 „
Therefore there is placed in tubes	1139·21 grains of

the potassa solution.

Then the cork connectors of the U-tubes were made good, and a junction with the receiver M fitted in the form of the tube *x*. Evidence of the perfect tightness of the corks and tubes of the U-tubes is always afforded by the act of pressing the corks into their places. The compression of the air inside them raises and depresses the liquid contained in them to various levels. The continuance of these different levels for a short time, which always happens when good sound soft corks only are chosen, is an evident proof of the certain air-tight character of all the cork connectors of the tubes. Although no loss of sulphur could arise from an imperfect junction in this part of the apparatus, it is advisable to pay attention to securing air-tight joints, from the fact that a leakage, by allowing air to be drawn in there to supply the partial vacuum arising from the exhaustive action of the "aspirator," might seriously interfere with the required rate of inflow of atmospheric air through the pumice pieces of the "desulphurizing" vessel. When the connexion with the "aspirator" by finally joining *r* and *g* had been established, and a steady inflow of air set going by carefully putting this apparatus in action, the gas was burned off in eight hours with the same jet used with the first bulk, the gutter of the "Desulphurizer" being, as before, occasionally replenished with a little fresh strong ammonia as its contents become reduced in strength by exposure to the circulating current of atmospheric air.

When all the gas has been burned, and the products of its combustion absorbed, as it is evident they must be in one part or another of these condensing vessels, the operation of completely cleansing them of their contents remains to be performed. This, which at first glance may appear to be a troublesome undertaking, is by no means so if conducted in the following manner:—I have before described how we may proceed to effectually remove the condensed products from the receiver M, and the trumpet-tube O (see vol. xiv., page 659): also in what way the liquid of the "desulphurizing" gutter can be, without loss, added to the other portions of fluid containing the products of the analysis, so that I have now merely to deal with the removal of what is contained in the U-tubes and the bottle *g*, if, during the performance of the process, anything has been carried over from the former into the latter.

(*To be continued.*)

Correspondence.

DIVIDENDS OF GAS COMPANIES.

SIR,—The bill which has just been laid before the House of Commons for altering the Metropolis Gas Act of 1860 entirely ignores the right of the companies to their dividends of 10 per cent., and prescribes a scale of dividends and of prices much below those granted, or rather confirmed, to the companies by that Act.

This is a measure of grave importance, not only to the metropolitan gas companies, but to all gas, water, and railway companies, and indeed to all companies possessing a parliamentary title.

It is time that the position of the metropolitan gas companies, with regard to their dividends, should be well understood.

The following statement, therefore, from one professionally and officially concerned in the companies case, may be found useful.

Twenty years since Parliament enacted certain well-digested codes of law, or "Consolidation Acts," for the uniform regulation of all gas, water, and railway companies who should thereafter apply for parliamentary powers. Ever since those codes were passed, instead of the special Acts of various companies being lengthened, by the insertion of regulations on the various subjects dealt with in the codes, it has been the practice to provide, in each special Act, that the code shall be considered as incorporated therein, and as forming part thereof.

One of the matters regulated by these codes is the profits of companies, and how they shall be appropriated, and the following are the provisions on this head contained in the code applicable to gas companies—namely, the Gas-Works Clauses Act, 1847.

By section 30, no larger profit is to be divided annually than 10 per cent., which is to be the prescribed rate, if the company's special Act does not prescribe a different one, on the paid-up capital, "*unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend* which shall have fallen short of that yearly rate."

By section 31, if the profits in any year amount to a larger sum than suffices, "*after making up the deficiency in the dividends of any previous year,*" to pay the prescribed dividend, the excess shall be invested in securities, to form, with the accumulation of interest, a reserve-fund equal to one-tenth of the nominal capital, "*to answer any deficiency which may at any time happen in the amount of divisible profits,* or to meet any extraordinary claim or demand which may at any time arise;" and if the fund be reduced, it may be from time to time restored.

By section 34, if in any year the profits are not sufficient to pay the prescribed dividend, the company *may take from the reserve-fund* the amount *necessary to make the dividend up to the prescribed amount.*

By section 35, very simple machinery is provided, which can be put in motion by "*any two gas-rate payers,*" for an examination into the affairs of the company, and if it shall appear that the company is making a higher rate of profit than that authorized, then the company, *in case the whole of the reserve-fund is complete, and the prescribed dividends have been paid,* shall make such reduction in the price of gas as the Court of Sessions shall order, "*so as the reduced price insure to the company, as near as may be, the authorized profit.*"

By section 38, in order that the public may know what profits the companies are making, they are required to file their accounts with the clerk of the peace.

It is said that a coach and six may be driven through any Act of Parliament, but it would be difficult indeed to frame clauses to provide more clearly than the above-recited clauses do for the maintenance of a 10 per cent dividend.

Nearly all the metropolitan companies were established before the passing of the Gas-Works Clauses Act. Some of them had occasion, subsequently, to apply for parliamentary powers to raise additional capital, and on those occasions they were subjected to that Act; but the majority of the companies before 1860 were *not* subject to that Act, and *had the right to pay any dividend they could earn.*

But when the vestries promoted the Metropolis Gas Bill (1860) to control the companies, it was contended that all the companies should be made subject to the Gas-Works Clauses Act, which was accordingly incorporated in that bill.

When, however, the bill was reported in the House of Commons by the select committee to whom it was referred, it appeared in a shape that would have allowed the shareholders only 8 per cent. instead of 10 per cent. dividend, the rate of remuneration laid down by the Gas-Works Clauses Act (1847). The companies appealed from this decision of the committee to the whole House, whereupon (on the 10th of July, 1860) a debate took place, the result of which was that the select committee consented, at the suggestion of the then Home Secretary, Sir George Cornewall Lewis, and in accordance with the general feeling of a very full House, to take back the bill for amendment. It was thereupon recast by them in the form of the Metropolis Gas Act (1860), by which the right to a 10 per cent. dividend was maintained, but with the modification (see section 2 of the Metropolis Gas Act) that, instead of being allowed, like other gas companies, to make up to 10 per cent. "any previous dividend that may have fallen short of that rate," the metropolitan companies were prohibited from supplementing "any dividend which shall have been payable more than six years previously"—a restriction which deprived them of some £300,000.

Since the Gas-Works Clauses Act (1847) was passed, it has been incorporated in some 250 special Acts of gas companies.

The profit clauses in the Water-Works Clauses Act are verbatim the same as in the Gas-Works Clauses Act.

The law with regard to railway companies is, that the Government may cut down their charges on guaranteeing a 10 per cent. dividend to the proprietors.

From the language of the Gas-Works Clauses Act, it would appear that Parliament intended the price of a company's gas to be regulated by the provisions above cited, as it was to be from time to time reduced as the surplus profit beyond the prescribed rate allowed of it. It has, however, for many years been the practice not only to incorporate that Act in the special Act of any gas company before Parliament, but to superadd a maximum price; the effect of

which is, that the company may divide 10 per cent. under the Gas-Works Clauses Act, *if they can earn it at the price sanctioned by the special Act.* If, on the other hand, the maximum price is insufficient to pay 10 per cent., the company, not being able to raise their charges, must put up with a lower rate of dividend. The maximum price, however, has, except in a few instances of severe opposition or of compromise, been fixed at a rate sufficiently in excess of the actual charge of the company to secure the profit of 10 per cent.

How, then, do the metropolitan gas companies stand with regard to their maximum price? Before 1860 the majority of them had the right to charge any price they pleased. They were then charging, for the most part, 4s. 6d. for common gas and 6s. for cannel gas. By the controlling Act obtained by the vestries in that year, it was provided (section 40) that no company should increase those rates, "unless there should be such increase in the cost of gas, or any other circumstances affecting the company, as would warrant such advance;" and before raising the price the companies have to give notice, and if the local authority dissent from such alteration, an arbitration is to decide whether it is to be allowed. And, by the same section, no gas company can charge more than 5s. 6d. for common gas and 7s. 6d. for cannel gas.

In what position has Parliament thus placed the metropolitan gas companies, unless it be that so long as they supply the public with 12 and 20 candle gas, at prices not exceeding those above quoted, they are entitled to their 10 per cent. dividends and reserve-funds? As the companies present profits are obtained from prices in no case exceeding 4s. for common gas and 5s. 6d. for cannel gas, it is pretty clear that, although the cost of making gas is increasing from the rise in coals and labour, the 10 per cent. dividends of the companies are not endangered by the maximum prices being limited to 5s. 6d. and 7s. 6d.

Parliament having so deliberately and repeatedly laid it down that 10 per cent. is not too high a rate of profit to hold out as an inducement to capitalists to embark in useful public undertakings (and surely few can be more useful than those engaged in supplying the metropolis with gas), any defence of that moderate trading profit is quite unnecessary. With such a scale of remuneration in prospect as that proposed by the present bill, the gas companies never would have undertaken the supply of the metropolis with gas. Of course the rate of 10 per cent. is only obtained on a portion of the capital, the loans and preference stocks amounting to a considerable sum.

It is difficult to understand why the metropolitan gas companies should be called upon again to do battle for their 10 per cent. dividends, after that rate of remuneration has been so deliberately granted to gas companies generally, has been confirmed to the metropolitan companies by the Metropolis Gas Act (1860), and has also been granted to water and railway companies.

If Sir Stafford Northcote has read the correspondence he has had with the Metropolitan Board of Works on the supply of gas to the metropolis, he must have noticed that even they do not dispute the parliamentary title of the companies, for in their letter to the Board of Trade of the 17th of January, 1867, settled and agreed upon at a committee of the whole Board, it is said, "Moreover, the companies *can* and do take out of the reserve-fund any sum which may be necessary *to make up* 10 *per cent. dividend, so that, practically*, 10 *per cent. dividend is guaranteed before any reduction in price can take place.*"

Relying upon the faith of Parliament, by whom the dividend of 10 per cent. has thus been authorized, most of the present proprietors of the gas companies, who are a non-speculative body, have given high premiums for their shares, when they found the prosperity of the concern assured, and a 10 per cent. premium only pays them from 5 to 7 per cent. on their investment; while original shareholders who have retained their holdings in the hope of ultimate prosperity, have not, owing to the small profits made by the companies in early times, received on the average a higher return on their capital.

If the deliberate legislation, on the faith of which these persons hold their investments and have severally embarked their capital, is now to be repealed at the instance of the customer, and their present incomes largely cut down, there is no reason why the precedent should not be applied at the instigation of practised agitators to other gas companies, and to water and railway companies; and that an extension of this kind of interference is already in contemplation does not seem improbable, for a clause in the new bill provides that the metropolitan gas companies shall be subject to any "revisions and alterations" of the Act, and to any *new Acts for regulating gas companies* that Parliament may hereafter determine upon.

Hampstead, April 1, 1867. S. B.

TAR AS FUEL.

Sir,—Can any of your readers inform me of the most successful method of delivering tar for fuel into furnaces under settings of retorts?

I am aware that in furnaces built expressly for consuming tar, it is conducted down by means of a fire-tile, but as I cannot let down my beds to alter the furnaces, and cannot get a market for the tar, I wish to use it as fuel in the ordinary furnace by delivering it through a 4-inch opening over the furnace-door. The tar answers the purpose well, but as it is necessary that the tar should be delivered about 12 to 18 inches in the furnaces, it soon corrodes, and burns away either pipe or angle iron.

Manager.

DESTRUCTION OF GAS-PIPES BY RATS.

Sir,—As gas has become one of the necessaries of life, and superior to every other artificial light, and at the present increased rate of consumption doubles itself in every seven years, it behoves all of us to make it as secure from danger as we possibly can. I could give you several cases where gas-pipes have been gnawed away by rats or mice. I will give you one instence in particular. A short time ago I was called upon to examine a gas-meter where the consumption had been three times as much as the corresponding quarter. I asked if they had increased the number of lights, or had larger burners put on, or if they had any escapes in their fittings. Their reply was the number of lights was the same, and they had no escapes. I then took the index of the meter, and ordered them not to light the gas till my return. After a few hours absence I again looked at the index of the meter and found it had registered 150 feet. Of course, they at once condemned a meter that would register whether the gas went through it or not. In order to convince them, I ordered all the pipes to be examined, and in the attic, where a pipe was laid, the rats had gnawed through it; there was plenty of ventilation, which accounted for the gas not smelling. About three years ago I had gas put into my room; the pipe was laid between the joists, and to my surprise I soon found out that the rats were constantly gnawing at it; it behoved me, therefore, to find out a remedy or give up the gas. I had the boards taken up and the pipes coated with coal-tar varnish; the rats did not come for six months after. Although I can now often hear them gambolling about, I have not heard one nibble at the gas-pipe. I believe if all gas managers would insist upon their pipes being varnished, there would be fewer complaints from the public, and, what is better still, fewer explosions. R. L. Robinson.

Gas and Water Works Office, Kendal, March 12, 1867.

Register of New Patents.

2244.—Charles Denton Abel, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in joints or connexions for pipes.* A communication. Patent dated Aug. 31, 1866.

The invention consists in joining the ends of pipes by means of rings or short tubes of india-rubber or other similar suitable elastic material, so formed and so arranged in combination with a peculiar formation of the ends of the pipes that a water, steam, or gas tight joint is thereby produced, which, while it allows of any lateral or longitudinal motion of the pipes at such joints, will become all the more water, steam, or gas tight the greater the internal or external pressure exerted thereon may be. In forming socket and spigot pipes for sustaining internal pressure, the spigot end has a rim or shield, against which rests a socket or cap-shaped india-rubber ring, the edge of which abuts against the circular shield formed on the spigot. The fluid or gas under pressure in the pipes is forced into the open end of the ring, and on compressing the sides thereof against the surfaces of the socket and spigot, a gas and fluid tight joint is obtained.

2248.—Henry George Scott, of Leeds, in the co. of York, civil engineer, and Nathan Hallowell, of Greenhill, near Sheffield, in the co. of Derby, mechanical engineer, for "*Improvements in valves for pumps, said improvements being also applicable to steam-valves.*" Provisional protection only obtained. Dated Aug. 31, 1866.

This invention consists in forming the bucket-clack or valve of a spiral spring, which may be composed of steel, iron, or other suitable material. By this arrangement the beat of the valve is mitigated, and a smoother action obtained. The spring may be compressed and the valve closed by shoulders on the valve-spindle, or by other means.

2277.—William Thomas Sugg, of Vincent Works, Vincent Street, in the city of Westminster, for "*Improvements in apparatus for regulating the supply of gas.*" Patent dated Sept. 5, 1866.

These improvements relate to the construction of governors especially adapted for regulating the supply of gas to public lamps, and consist, firstly, in casting the cases of metal (by preference of a mixture of zinc or lead, tin, and antimony) in brass or other metallic moulds, whereby a certain degree of perfection is ensured, and the labour in finishing them greatly diminished. Secondly, in casting the orifices or channels through the said cases in such a manner as to allow of ample space for the gas to flow without interruption, and at the same time afford great facility for cleansing or removing any deposit that may collect therein. Thirdly, in moulding the leather or gutta-percha prepared material for the diaphragm into a curved surface, and impressing it with a number of concentric indentations or rings, whereby the rising and falling of the diaphragm by the pressure of the gas is rendered more easy and gradual in its action. Fourthly, in the mode of securing the diaphragm to the lower part of the case, by means of a flat metallic ring screwed on its periphery. Fifthly, in

the mode of attaching the valve to the diaphragm by metallic surface nut and washers; and, sixthly, the mode of fastening the upper and lower cases by screws passing through a hollow D-shaped piece of metal, which, while it serves as a convenient conduit, also affords means for securing the cases together.

Any burner may be used with this governor, and that preferred for street-lamps produces a form of flame commonly known as the bat's-wing, and is made of steatite or lava; and although great improvement is made by varying the shape of that part of the burner from which the gas issues, no claim is made to this as a part of the invention.

The action of the apparatus is exceedingly simple. If the pressure of the gas at the inlet is more than necessary to give the required size of flame, the gas will pass between the valve and its seat, and press upon the under side of the diaphragm, which, as it rises, will operate upon and tend to close the valve, and thereby diminish the pressure at the outlet of the burner. Thus whatever the excess of pressure may be at the inlet, the pressure at the outlet will remain constant. The adjustment of the governor to produce any given pressure at the outlet is made by increasing or reducing the leaden weight attached to the upper side of the diaphragm.

The governor or regulator described as above refers only to street-lamp governors, but regulators made upon exactly the same principle, although upon a larger scale, are equally adapted to the use of consumers generally.

2280.—James Wilson, of Royal Exchange Buildings, in the City of London, civil engineer, for "*Improvements in street gas-lamps.*" Provisional protection only obtained. Dated Sept. 5, 1866.

The improvements consist in forming the lamps without side frame, the top being supported and connected to the bottom by two small rods of iron secured to the top part of the lamp-post, the edges of the glass sides joining each other being kept in their places by the rebates formed in the metal top and bottom only of the lamp, thereby causing no shadow on the ground below, and increasing the amount of available light from each burner. Two small hinged doors are placed in the bottom of the lamp, which enable the gas to be lighted from below, no ladder being required except for cleaning, and for this purpose a double-hinged door is placed at the top of the lamp, which, when opened, falls back on the lamp, and cannot, therefore, be swung about and broken by the wind.

2301.—Coleman Defries, of the firm of Jonas Defries and Son, of 147, Houndsditch, in the City of London, manufacturer, for "*An improved float-light.*" Patent dated Sept. 7, 1866.

This invention consists of an arrangement of jets and reflectors for lighting the stages of theatres, and for improving the ventilation thereof, and an adaptation of an endless chain for raising and lowering coloured glass mediums for giving stage effects. The details of the invention require drawings to make them intelligible.

2315.—Frederick Warner, of Jewin Crescent, Cripplegate, in the City of London, William Stewart, of Carthusian Street, also in the City of London, and George William Barber, of King Street, Southsea, in the co. of Hants, for "*Improvements in water-closets, and in valves and regulating apparatus for the same, and other purposes.*" Patent dated Sept. 8, 1866.

In constructing water-closets according to this invention, a syphon-trap is employed as heretofore, and the pan is arranged to communicate with the ascending limb thereof both by a side opening, to which a flap-valve is fitted, and also by an overflow-passage, which is provided to prevent too large a quantity of water being retained in the pan. This overflow-passage opens into the ascending limb of the trap at a point above the valve before mentioned. All these parts may be made in one piece of earthenware or of cast iron, or the pan may be made separately and cemented into a socket.

2319.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in the manufacture of seamless metallic tubes.*" A communication. Provisional protection only obtained. Dated Sept. 10, 1866.

This invention relates to the manufacture of metallic tubes having no longitudinal seam or join, to be brazed or welded; and the nature of the invention consists in first forming a hollow casting of any ductile metal or alloy, or a hollow figure or cylinder of laminated metal, on which the tube is to be formed, and then fitting within it, either by casting or otherwise, a core composed of any suitable ductile metal, or alloy, or compound, of sufficient rigidity to form a mandril, but capable of being more readily fused or liquefied by chemical agents than the material which is used for forming the tube, and afterwards rolling the combined mass to the required length and diameter, and finally melting or otherwise liquefying and running off the core to form the tube, which may be subsequently finished or brazed.

2331.—William Olley, of Enfield, in the co. of Middlesex, mechanic, for "*Improvements in apparatus for separating animal and vegetable matters from water and other liquids.*" Provisional protection only obtained. Dated Sept. 11, 1866.

This invention consists in the use of apparatus composed of an outer globe or case and an inner globe or bag, through which the water or other liquid is passed from the vessel in which it is contained to any required receptacle. The outer globe may be composed either of india-rubber, or thin sheet iron, zinc, or other metal, according to the purpose for which it is required, and it is formed with a neck at the upper part, to receive a tube or pipe or other means of communication leading from the cistern, water-butt, cask, or vessel containing the liquid, and an outlet at the lower part leading to any required receptacle for the cleansed water or other liquid. The inner globe or bag may be composed of horse-hair, or wire gauze, or similar materal; and it is sewn or otherwise fastened at the upper open part to the interior of the outer globe or case, so as to form a separate bag within the same for intercepting and separating insects or vegetable matters from the water or other liquid passed through it.

APPLICATIONS FOR LETTERS PATENT.

753.—Nathan Thompson, of 15, Abbey Gardens, St. John's Wood, in the co. of Middlesex, for "*Improvements in connecting the ends of pipes and tubes and of hollow or solid shafting.*" March 15, 1867.

755.—William Robert Lake, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in rotary engines and pumps.*" A communication. March 15, 1867.

762.—John Grundy, of Wolstenholme Hall, in the co. of Lancaster, for "*Certain improvements in apparatus applicable for the prevention of smoke.*" March 16, 1867.

777.—Henry Justinian Newcome, of 49, King William Street, in the City of London, for "*Improved apparatus for warming or heating buildings.*" March 18, 1867.

790.—James Hislop, manager of the Gas-Works, Ayr, N.B., for "*Improvements in the arrangement of apparatus for 'scurfing' or removing carbon from gas-retorts.*" March 19, 1867.

791.—Matthew Semple, of Axminster, in the co. of Devon, gentleman, for "*An improved mode of and apparatus for warming and ventilating buildings.*" March 19, 1867.

819.—James Greenshields, of Glasgow, in the co. of Lanark, N.B., for "*An improved compound or combination of materials to be used for the production of illuminating gas.*" March 21, 1867.

823.—William Lorberg, of Danvers Street, Chelsea, in the co. of Middlesex, for "*Improvements in the construction of urinals, water-closets, and other similar vessels.*" March 21, 1867.

827.—George Haseltine, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, civil engineer, for "*An improved steam heating and ventilating apparatus.*" A communication. March 21, 1867.

833.—John Hathornthwaite Winder, of Sheffield, in the co. of York, manufacturer, for "*An improved rotary pump for raising or forcing fluids.*" March 22, 1867.

836.—Joseph Whitley, of the Railway Brass-Works, Leeds, in the co. of York, for "*Improvements in stop-valves or taps for steam and water.*" March 22, 1867.

855.—George Tomlinson Bousfield, of Loughborough Park, Brixton, in the co. of Surrey, for "*Improvements in apparatus for extinguishing lamps.*" A communication. March 23, 1867.

860.—William Matthews, of Tipton, in the co. of Stafford, for "*An improved means of draining mines, coal-pits, and other places from whence it is desired to raise water.*" March 25, 1867.

865.—Alexander Parkes, of Birmingham, in the co. of Warwick, for "*Improvements in coating metal tubes or rods, to render them suitable for many ornamental purposes.*" March 25, 1867.

902.—Angus Mackenzie, of 106, Capel Street, in the city of Dublin, plumber, and Samuel Robinson, of 52, Brunswick Street, in the city of Dublin aforesaid, foreman builder, for "*Improvements in apparatus to be applied to cisterns for preventing waste of water.*" March 28, 1867.

904.—William Bryer Nation, of 394, Old Kent Road, in the co. of Surrey, for "*Improvements in engines worked by steam, water, and other fluids and gases under pressure.*" March 28, 1867.

915.—Matthew Piers Watt Boulton, of Tew Park, Oxfordshire, esquire, for "*Improvements in apparatus for receiving motion or energy from fluids and for imparting it to them, and in the propulsion of vessels, and apparatus to be used for that purpose.*" March 28, 1867.

GRANTS OF PROVISIONAL PROTECTION.

458.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the application of certain hydrocarbons to the obtainment of light and heat, and in the apparatus or means employed therein.*" A communication. Feb. 20, 1867.

556.—Adolphe Gilbert Chalus, of 2, Rue Sainte-Appoline, Paris, empire of France, merchant, for "*Improvements in apparatus for producing artificial light from gas, air, and liquids*" Feb. 28, 1867.

563.—Alexander Angus Croll, of Coleman Street, in the City of London, civil engineer, for "*Improvements in the treatment of hydrocarbon oils for the purpose of obtaining a permanent gas.*" Feb. 28, 1867.

571.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*Improvements in steam and gas engines.*" A communication. Feb. 28, 1867.

577.—Walter Christopher Thurgar, of the city of Norwich, surgeon, for "*Improved means or apparatus for regulating the supply of gas to burners.*" March 1, 1867.

579.—William Parry, of Birmingham, in the co. of Warwick, mineral surveyor, and John Frearson, of Birmingham aforesaid, mechanical engineer, for "*Improvements in treating or purifying sewage, and in apparatus to be used for that purpose.*" March 1, 1867.

591.—John Ambrose Coffey, of 32, Great St. Helen's, in the City of London, consulting engineer, for "*Improvements in self-acting steam and fluid safety gauges, the said improvements being applicable to cocks or taps and valves.*" March 2, 1867.

621.—John Garrett Tongue, of the firm of Tongue and Birkbeck, patent agents and engineers, of 34, Southampton Buildings, Chancery Lane, in the co. of Middlesex, for "*Improvements in steam-engines and pumps.*" A communication. March 6, 1867.

624.—John Thompson, of Nettlebed, in the co. of Oxford, stoneware manufacturer, for "*Improvements in the manufacture of gas.*" March 6, 1867.

631.—Charles William Siemens, of 3, Great George Street, Westminster, in the co. of Middlesex, for "*Improvements in apparatus for measuring water, alcohol, and other fluids.*" Partly a communication. March 7, 1867.

639.—Robert Luke and William Parkes, of Birmingham, in the co. of Warwick, metallic bedstead manufacturers, for "*Certain improvements in the manufacture of metallic bedsteads, part of which said improvements are applicable to cornice-poles, gas-fittings, balustrades, and other articles.*" March 7, 1867.

650.—William Young, manager of the Oil-Works, Straiton, in the co.

of Mid Lothian, N.B., and PETER BRASH, of Leith, in the same co.' soap, candle, and oil manufacturer, for "*Improvements in the distillation of bituminous substances.*" March 7, 1867.

686.—WILLIAM BETER NATION, of 394, Old Kent Road, in the co. of Surrey, for "*Improvements in apparatus for raising, forcing, propelling, and exhausting fluids and gases.*" March 11, 1867.

692.—EDWARD THOMAS HUGHES, of the firm of Hughes and Son, of 123, Chancery Lane, London, patent agents, for "*An improved apparatus for the promotion of economy in the combustion of gas, petroleum, and other oils.*" A communication. March 11, 1867.

696.—MATTHEW PIERS WATT BOULTON, of Tew Park, Oxfordshire, esquire, for "*Improvements in propulsion, and in rotary apparatus for giving motion or energy to fluids, and receiving motion or energy from them.*" March 11, 1867.

709.—CHARLES MASCHWITZ, the younger, of Birmingham, in the co. of Warwick, merchant, for "*Improvements in taps and valves.*" A communication. March 12, 1867.

INVENTIONS PROTECTED FOR SIX MONTHS BY THE DEPOSIT OF A COMPLETE SPECIFICATION.

534.—FRANCIS VERE WRIGHT, of St. James's Place, in the city of Westminster and county of Middlesex, gentleman, for "*Improved adjustable reflectors for lamps and lighting purposes.*" Feb. 27, 1867.

560.—STILLMAN BOYD ALLEN and JAIRUS HANDY WINSOR, of the State of Massachusetts, U.S.A., for "*Generating heat by the admixture and combustion of a hydrocarbon vapour, air, and the gaseous components of steam.*" A communication. Feb. 28, 1867.

NOTICES TO PROCEED.

2920.—SOLOMON WILLIAM WOODROFFE, of Costock, in the co. of Nottingham, farmer, for "*Improvements in the construction of privies, dust-holes, commodes, water-closets, ash-pits, and tank-covers, and for other similar purposes.*" Nov. 9, 1866.

2949.—JOHN DENLEY, of Cheltenham, in the co. of Gloucester, for "*Improvements in chimney-tops for the purpose of preventing or curing the down draught of smoke.*" Nov. 10, 1866.

2965.—GEORGE WHITEHEAD, of Liverpool, in the co. of Lancaster, chimney sweeper and smoke-jack cleaner, for "*Improvements in chimney-tops or cowls.*" Nov. 13, 1866.

2983.—THOMAS SEAVILLE TRUSS, of 118, Fenchurch Street, in the City of London, civil engineer, for "*Improvements in the construction of pipes, and in the mode of joining the same for the transmission of gas, water, steam, air, and other fluids.*" Nov. 14, 1866.

2985.—HESKETH HUGHES, of Birmingham, in the co. of Warwick, engineer, for "*Improvements in the manufacture of tubes and other articles, and in the apparatus employed therein.*" Nov. 14, 1866.

3048.—JOHN ROBERTSON, of Manchester, in the co. of Lancaster, machine merchant, for "*Improvements in apparatus for regulating and controlling the pressure and flow of fluids.*" Nov. 20, 1866.

3139.—EDWARD HUGHES, of Bagilt, in the co. of Flint, for "*Improvements in machinery or apparatus for exhausting and forcing air and gases, and for propelling vessels.*" Nov. 29, 1866.

3308.—WILLIAM CLARK, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in carburetters.*" A communication. Dec. 15, 1866.

3405.—WILLIAM CLARK, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in valves.*" A communication. Dec. 28, 1866.

404.—HENRY HOUFE, of Tollington Park, Upper Holloway, in the co. of Middlesex, for "*Improvements in outside lamps or lanterns for shop-fronts, or other similar places.*" Feb. 13, 1867.

449.—HENRY ALDER, of 32, Grange Road, Edinburgh, for "*Improvements in gas-meters.*" Feb. 19, 1867.

560.—STILLMAN BOYD ALLEN and JAIRUS HANDY WINSOR, of the State of Massachusetts, U.S.A., for "*Generating heat by the admixture and combustion of a hydrocarbon vapour, air, and the gaseous components of steam.*" A communication. Feb. 28, 1867.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

467.—CHARLES ESPLIN, "*Improvements in apparatus for regulating the flow of gas to burners.*" Feb. 24, 1864.

573.—WILLIAM CLARK, "*Improvements in water-pressure engines for raising and forcing water, and for other purposes.*" March 8, 1864.

592.—EDWARD BISHOP and WILLIAM BAILEY, "*Improved means and apparatus for evaporating the water contained in fæcal or excrementitious matter.*" March 9, 1864.

612.—FREDERICK WALTON, "*Improvements in machinery for raising water and other liquids.*" March 10, 1864.

615.—WILLIAM RENWICK BOWDITCH, "*Improvements in regulating the flow of gas in railway and other carriages, and in apparatus employed to regulate the flow of gas in such railway and other carriages, part of such improvements being applicable to the regulation of gas supplied to stationary lights.*" March 11, 1864.

653.—EDMUND BALLER, "*Improvements in gaseliers of the kind commonly called 'water-slide gaseliers.'*" March 15, 1864.

675.—EDWARD THOMAS WAKEFIELD, "*Improvements in gas lighting and ventilating apparatus.*" March 16, 1864.

694.—GEORGE FREDERIC CHANTRELL and JEAN RAYMOND, "*Improvements applicable to chimney-tops and ventilators, and in the manufacture thereof.*" March 18, 1864.

708.—EDWARD BORROWS, "*Improvements in pumps for lifting or moving liquids.*" March 21, 1864.

739.—FREDERICK TYERMAN, "*Improvements in apparatus to be used in combination with parts of gas and lamp fittings.*" March 23, 1864.

Parliamentary Intelligence.

HOUSE OF LORDS.

THURSDAY, MARCH 14.

The BARKING GAS, and the FISHERTON ANGER AND BEMERTON WATER Bills, were reported, with amendments.

The CAMBORNE WATER Bill was committed.

The GREAT GRIMSBY GAS; PRESCOT GAS; RICHMOND GAS; WANDSWORTH AND PUTNEY GAS; and the MITCHAM AND WIMBLEDON GAS Bills, were referred to a Select Committee, consisting of Earl Huntingdon, Earl Denbigh, Viscount Hardinge (chairman), Lord Bagot, and Lord Northwick.

FRIDAY, MARCH 15.

The DARTFORD GAS Bill was reported, with amendments.

The REDHILL AND WARWICK TOWN WATER Bill.—The Select Committee reported that it was not expedient to proceed further with the Bill. Read, and ordered to lie on the table.

MONDAY, MARCH 18.

The FISHERTON ANGER AND BEMERTON WATER, and the BARKING GAS Bills, were read a third time, and passed, and sent to the Commons.

A petition was deposited against the GREAT GRIMSBY GAS Bill, from the inhabitants of Clee, &c.

TUESDAY, MARCH 19.

The PAIGNTON WATER Bill was reported from the Select Committee, with amendments.

The PRESCOT GAS, and the MITCHAM AND WIMBLEDON GAS Bills, were committed.

The WINDSOR ROYAL GAS Bill was read the first time, and referred to the Examiners.

THURSDAY, MARCH 21.

The RICHMOND GAS Bill.—The Queen's consent signified, and Bill reported from the Select Committee, with amendments.

The WANDSWORTH AND PUTNEY GAS Bill.—Report from the Select Committee that the promoters do not intend to proceed further with the Bill during the present session. Read, and ordered that the Bill be not further proceeded with during the present session.

The DARTFORD GAS Bill.—Read the third time, and passed, and sent to the Commons.

FRIDAY, MARCH 22.

The CAMBORNE WATER; MITCHAM AND WIMBLEDON GAS; WEST KENT GAS; and the PRESCOT GAS Bills, were reported, with amendments.

The PAIGNTON WATER Bill was read the third time, and passed, and sent to the Commons.

The KIDDERMINSTER GAS Bill was read the first time, referred and to the Examiners.

MONDAY, MARCH 25.

The Lord Chancellor acquainted the House that Standing Orders applicable to the WINDSOR ROYAL GAS Bill have been complied with.

The SOUTHWARK AND VAUXHALL WATER Bill was brought from the Commons, read a first time, and referred to the Examiners.

The HUYTON AND ROBY Bill was reported, with amendments.

The GREAT GRIMSBY GAS Bill was reported from the Select Committee with amendments.

TUESDAY, MARCH 26.

The CAMBORNE WATER, and the PRESCOT GAS Bills, were read a third time, and passed, and sent to the Commons.

THURSDAY, MARCH 28.

The WINDSOR ROYAL GAS Bill was read a second time, and committed.

The MITCHAM AND WIMBLEDON GAS, and the WEST KENT GAS Bills, were read a third time, and passed.

The BARNSLEY GAS, and the STRATFORD-UPON-AVON GAS Bills, were read a first time, and referred to the Examiners.

FRIDAY, MARCH 29.

The WINDSOR ROYAL GAS; ABERTILLERY GAS AND WATER; and the RISCA, AND PONTYMISTER GAS Bills, were reported, with amendments.

The Lord Chancellor acquainted the House that the Standing Orders applicable to the METROPOLIS GAS Bill have been complied with; and also the certificate that no further Standing Orders are applicable to the SOUTHWARK AND VAUXHALL WATER Bill.

The MIDLAND RAILWAY (DERBY GAS-WORKS) Bill was read a second time, and committed.

The DUNDEE NEW GAS; ETON GAS; HAMPTON COURT UNITED GAS; ROCHESTER, CHATHAM, AND STROOD GAS; SCARBOROUGH GAS; SOUTHPORT WATER; SOUTH SHIELDS GAS; STALYBRIDGE GAS; and the SUTTON, SOUTHCOATES, AND DRYPOOL GAS Bills, were read a first time, and referred to the Examiners.

HOUSE OF COMMONS.

THURSDAY, MARCH 14.

The SOUTHPORT IMPROVEMENT (WATER); SOUTHPORT WATER; SCARBOROUGH GAS; SOUTHWARK AND VAUXHALL WATER; STRATFORD-UPON-AVON GAS; and the TYNEMOUTH PARISH GAS Bills, were reported, and reports to lie upon the table.

MONDAY, MARCH 18.

The FARNWORTH PARK AND IMPROVEMENT, and the CAMBRIDGE GAS Bills, were reported. Reports to lie upon the table.

The WINDSOR ROYAL GAS Bill was read the third time, and passed.

The KIDDERMINSTER GAS Bill, as amended, was considered. To be read the third time.

The BIRKENHEAD IMPROVEMENT COMMISSIONERS Bill.—The report of the Referees on Private Bills on several petitions against the Bill was laid upon the table.

THE BIRKENHEAD IMPROVEMENT COMMISSIONERS BILL.

The Referees have reported on the petitions of William Inman and Robert Vyner, that this is a bill to authorize the Birkenhead Improvement Commissioners to make new water-works, and to extend the jurisdiction of the stipendiary magistrate for Birkenhead, and to amend the Acts relating to the said commissioners with respect to matters of police and otherwise.

Evidence was laid before the Referees that the present supply of water to the district of the Birkenhead Improvement Commissioners amounted to 16 million gallons per week, which would suffice for an increase of population in that district (at the same rate of increase which has taken place for some years past) for a period of from two to three years.

The quality of water is good, and provision has been made for the supply of the entire district at high pressure.

In the opinion of the Referees the proposed source of additional supply will be efficient, and the works proposed will effect the objects intended.

TUESDAY, MARCH 19.

The DUNDEE NEW GAS; HAMPTON COURT UNITED GAS; PETERBOROUGH WATER; ROCHESTER, CHATHAM, AND STROOD GAS; SOUTH SHIELDS GAS; STALYBRIDGE GAS; and the WELLS (SOMERSET) GAS Bills, were reported. Reports to lie upon the table.

The SOUTHWARK AND VAUXHALL WATER Bill, as amended, was considered.

A petition was presented against the WOLVERHAMPTON NEW WATER Bill, from the commissioners and inhabitants of Bilston.

WEDNESDAY, MARCH 20.

LEEDS CORPORATION WATER Bill.—Petition for additional provision; referred to the Examiners of Petitions for Private Bills.

The HERNE BAY WATER Bill, as amended, was considered.

The FISHERTON ANGER AND BEMERTON WATER, and the BARKING GAS Bills, were read the first time, and referred to the Examiners of Petitions for Private Bills.

THURSDAY, MARCH 21.

The ENFIELD GAS Bill was reported. Report to lie upon the table.

The KIDDERMINSTER GAS Bill was read the third time, and passed.

FRIDAY, MARCH 22.

The SOUTHPORT AND VAUXHALL WATER Bill was read the third time, and passed.

The BARNSLEY GAS, and the STRATFORD-UPON-AVON GAS Bills, as amended, were considered.

The EAST LONDON WATER Bills, &c.—Select Committee on the East London Water Bills, &c., nominated:—Mr. Ayrton, Mr. Sclater-Booth, Mr. Knatchbull-Hugessen, Colonel Hogg, and Mr. Benyon.

The METROPOLITAN WATER SUPPLY Bill—"To make better provision for facilitating and regulating the supply of water to the metropolis and metropolitan districts—presented, and read the first time. Referred to the Examiners of Petitions for Private Bills.

MONDAY, MARCH 25.

The DUNDEE NEW GAS; ETON GAS; HAMPTON COURT UNITED GAS; and the ROCHESTER, CHATHAM, AND STROOD GAS Bills, as amended, were considered.

The SCARBOROUGH GAS Bill, as amended, was considered, and amendments made.

The SOUTHPORT WATER; SOUTH SHIELDS GAS; and the STALYBRIDGE GAS Bills, as amended, were considered.

The SUTTON SOUTHCOATES AND DRYPOOL GAS Bill, as amended, was considered, and amendments made.

The DARTFORD GAS Bill was read a first time, and referred to the Examiners of Petitions for Private Bills.

LEEDS CORPORATION WATER Bill.—Report on petition for additional provision, that the Standing Orders have been complied with, laid upon the table.

FISHERTON ANGER AND BEMERTON WATER, and the BARKING GAS Bills.—Reports that the Standing Orders not previously inquired into have been complied with, laid upon the table.

The WOLVERHAMPTON NEW WATER-WORKS COMPANY.—A petition was deposited against dispensing with Standing Order 129 in the case of the petition of commissioners and inhabitants of Bilston, from the Wolverhampton New Water-Works Company.

TUESDAY, MARCH 26.

The DEWSBURY, BATLEY, AND HECKMONDWIKE WATER; HARTLEPOOL GAS AND WATER; HEYWOOD IMPROVEMENT; and the MOLD GAS AND WATER Bills, were reported, and reports to lie on the table.

The BARNSLEY GAS, and the STRATFORD-UPON-AVON GAS Bills, were read a third time, and passed.

The FARNWORTH PARK AND IMPROVEMENT Bill, as amended, was considered.

The PAIGNTON WATER Bill was read a first time, and referred to the Examiners of Petitions for Private Bills.

WEDNESDAY, MARCH 27.

The TYNEMOUTH PARISH GAS Bill, as amended, was considered, and amendments made.

A petition was presented against the EAST LONDON WATER Bills, &c., by the East Kent Water-Works Company.

The KEIGHLEY WATER, &c., Bill was reported.

THURSDAY, MARCH 28.

The DUNDEE GAS, and the ABERDEEN POLICE AND WATER Bills, were reported.

The DUNDEE NEW GAS; ETON GAS; HAMPTON COURT UNITED GAS; ROCHESTER, CHATHAM, AND STROOD GAS; SCARBOROUGH GAS; SOUTHPORT WATER; SOUTH SHIELDS GAS; STALYBRIDGE GAS; and the SUTTON, SOUTHCOATES, AND DRYPOOL GAS Bills, were read a third time, and passed.

FRIDAY, MARCH 29.

The FARNWORTH PARK AND IMPROVEMENT, and the HERNE BAY WATER Bills, were read a third time, and passed.

The ENFIELD GAS Bill, as amended, was considered.

The CAMBORNE WATER, and the PRESCOT GAS Bills, were read a first time.

SLIGO BOROUGH IMPROVEMENT BILL.

The Referees have reported on the petitions of the Sligo Town and Harbour Commissioners, Owen Wynne, Esq., and Roger C. Parke, Esq., that this is a Bill to make better provision for the local management of the borough of Sligo, and (amongst other things) for empowering the corporation to construct water-works and supply water, and for other purposes.

The population of Sligo, within the parliamentary boundary which it is proposed to supply, is 13,500.

The only existing supply is obtained from wells in the town, some o which are contaminated by the sewage.

The corporation proposes to make a storeage reservoir, containing 50 million gallons, and to supply to the town 400,000 gallons per diem. The service reservoirs would be at an elevation of about 170 feet, which would give a constant pressure of between 70 and 80 feet to the houses situated in the highest ground in the district.

The petitioners, the Sligo Town and Harbour Commissioners, objected to the efficiency of the works, the sufficiency of the estimate, the quality of the water, and to the provision by the storeage reservoir as inadequate.

The petitioners, Mr. Parke and Mr. Wynne, objected that their mills and other property situated on the river Doonally, below the site of the proposed storeage reservoir, would be damaged by the appropriation of the water for the supply of the town.

No provision is made for compensation in water, but the promoters stated that the requirements of their water-works would by no means exhaust the stream, and that they propose a compensation in money for any abstraction, for which their estimate is sufficient.

The Referees are of opinion that the works are efficient for the proposed object, that the estimate is sufficient, the quality of the water good, and the provision as to the storeage reservoir adequate.

The STOCKPORT CORPORATION WATER Bill was reported.

METROPOLIS GAS BILL.

Report, That the Standing Orders have been complied with, laid upon the table. Bill to be read a second time upon Monday, April 1.

METROPOLIS GAS AMENDMENT BILL.

A BILL to amend the Metropolis Gas Act, 1860, and to make further Provision for regulating the Supply of Gas to the Metropolis; and for other purposes connected therewith.

WHEREAS it is expedient that such provisions as are in this Act expressed be made for amending the Metropolis Gas Act, 1860 (in this Act referred to as the Act of 1860), and for further regulating the supply of gas to the metropolis, and for other purposes connected therewith:

May it therefore please your Majesty,

That it may be enacted, and be it enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

Preliminary.

1. This Act may be cited as the Metropolis Gas Act, 1867, and this Act and the Act of 1860 may be cited together as the Metropolis Gas Acts, 1860 and 1867.

2. In this Act—

The term "the City" means the City of London and the liberties thereof;

The term "the Commissioners of Sewers" means the Commissioners of Sewers of the City;

The term "local authority" includes the Commissioners of Sewers;

The terms "companies" and "company" mean the companies subject to the Act of 1860, and each of them;

The term "half year" means a half year reckoned from the *first* day of *January* and *first* day of *July* in each year;

The term "quarter" means a quarter of a year reckoned from the *first* day of *January*, *first* day of *April*, *first* day of *July*, and *first* day of *October* in each year;

The term "day" means (except in this section) *twenty-four hours* reckoned from *nine* o'clock in the forenoon of one day to *nine* o'clock in the forenoon of the next following day, so much of each day as is before *nine* o'clock in the forenoon being reckoned as part of the immediately preceding day of the month or week;

and this Act shall be read as one with the Act of 1860.

3. Where under this Act anything is required or authorized to be done by or in relation to the Metropolitan Board of Works and the Commissioners of Sewers, or those bodies disjunctively, the same shall be deemed to be required or authorized to be done by or in relation to the Metropolitan Board of Works for all purposes connected with the supply of gas to the Metropolis exclusive of the City, and by or in relation to the Commissioners of Sewers for all purposes connected with the supply of gas to the City.

4. Such parts of the Act of 1860 as are described in the first schedule to this Act are hereby repealed.

Metropolitan Gas Board.

5. There shall be a board, called the Metropolitan Gas Board, consisting of *three* competent and impartial persons of scientific knowledge and experience in relation to the manufacture and supply of gas, who shall be from time to time appointed by and shall be removeable by the President of the Board of Trade.

6. *Two* members of the Metropolitan Gas Board (in this Act referred to as the gas board) shall be a quorum thereof, and at least *two* members thereof shall concur in every act or determination of the board.

7. A copy of each certificate of the gas board required by this Act shall be sent by them to the Metropolitan Board of Works and the Commissioners of Sewers, and to each of the companies.

Illuminating Power.

8. The gas board shall, subject to the provisions of this Act, from time to time prescribe and certify the mode to be adopted for testing and recording the illuminating power of gas supplied by the companies, and the times of testing.

9. Until the gas board otherwise prescribe and certify, there shall be used for the purpose of testing illuminating power,—

1. The burner described in the second schedule to this Act (a specimen of which burner the Board of Trade shall, on the passing of this Act, cause to be deposited with the Warden of the Standards);
2. Sperm candles of *six* to the pound, each burning at the rate of *one hundred and twenty* grains per hour, manufactured in manner from time to time prescribed by the gas board and from materials obtained as the gas board from time to time direct (candles of which description are intended where candles are mentioned in the subsequent provisions of this Act).

10. If at any time the gas board prescribe and certify that a carcel lamp be substituted for candles, then a carcel lamp, constructed as the gas board from time to time direct, and consuming colza oil at the rate of *six hundred and forty-eight* grains per hour, shall be deemed equivalent to *nine* candles.

Purity.

11. The gas board shall with all practical speed after their appointment, and from time to time thereafter, inspect the works of the companies, and

investigate the processes of manufacture carried on therein, with the view of ascertaining the means adopted therein for purifying gas and for preventing nuisance, and may from time to time apply all such tests as they think expedient, at the works of the companies or elsewhere, for ascertaining the amount of sulphur and ammonia and of compounds thereof or other impurity with which gas supplied by them is charged.

12. The companies shall give to the gas board, and each member thereof, and to their clerks, servants, and workmen, access to the works of the companies, and shall, when required, afford to them and him all facilities for the proper execution of their and his duty.

13. The gas board shall from time to time prescribe and certify the maximum amount of impurity in each form with which gas supplied by the companies shall be allowed to be charged, and the time from which the allowance thereof shall be enforced as against each company, regard being had to the necessity for any alteration of works by a company consequent on any such certificate.

14. The gas board shall from time to time prescribe and certify the mode to be adopted for testing and recording the purity of gas supplied by the companies, and the times of testing.

15. Gas supplied by the companies shall be wholly free from sulphuretted hydrogen, and nothing in this Act shall authorize the gas board to allow of gas being charged with any amount of impurity in that form.

Testing.

16. The gas board shall from time to time prescribe and certify what testing-places and what apparatus therein for testing the purity and illuminating power of gas shall be provided by each company, every such place being not less than *one thousand yards* distant from the station from which the gas to be tested at it is supplied and each company shall provide and maintain such testing-places and apparatus accordingly.

17. The testing-places and apparatus provided by the companices shall be under the control and management of the Metropolitan Board of Works or the Commissioners of Sewers.

18. The company providing a testing-place may also have a separate testing-place in the same building under their own control and management.

19. The Metropolitan Board of Works and the Commissioners of Sewers shall as soon as may be after the *passing of this Act* appoint, and shall always keep appointed, at least one competent and impartial person to be the gas examiner at each testing-place.

20. There shall be a chief gas examiner, being a competent and impartial person, from time to time appointed by and removeable by the President of the Board of Trade.

21. The gas examiner at each testing-place shall test daily the illuminating power and purity of gas supplied by the company.

22. The testings of illuminating power shall be made *three* times at least each day, between the hours of *five* o'clock and *ten* o'clock in the afternoon in the months of *October* to *March*, both inclusive, and between the hours of *eight* o'clock and *eleven* o'clock in the afternoon in the months of *April* to *September*, both inclusive; and nothing in this Act shall authorize the gas board to prescribe fewer testings than those directed by this section.

23. The average of all the testings of illuminating power prescribed by the gas board on each day shall be deemed to represent the illuminating power on that day.

24. The company may, if they think fit, on each occasion of the testing of the gas by the gas examiner be represented by some officer, but such officer shall not interfere in the testing.

25. The gas examiner shall on each day make and deliver a report of the result of the testings conducted by him on the immediately preceding day to the Metropolitan Board of Works or the Commissioners of Sewers, and to the chief gas examiner, and a copy of each such report shall, not later than the following day, be furnished by the Metropolitan Board of Works or the Commissioners of Sewers to the company; and the books kept by the gas examiner for recording the results of the testings by him shall be open at all reasonable times to the inspection of the company without payment.

26. If the company think themselves aggrieved by any report of the gas examiner, they may, within *seven* days after the day to which the report relates, appeal to the chief gas examiner, whose decision shall be final and conclusive, and the chief gas examiner shall report every such decision to the Metropolitan Board of Works and the Commissioners of Sewers.

27. If in any case the company do not appeal as aforesaid the report of the gas examiner shall be final and conclusive.

Price of Gas.

28. The maximum price per *one thousand* cubic feet chargeable by a company for gas shall vary according to illuminating power, as follows:—

For gas of illuminating power equal to that of *fourteen* but not equal to that of *fifteen* candles the maximum price shall be *three shillings and sixpence;*

For every increase in illuminating power equal to that of one candle or more the price of *three shillings and sixpence* may be increased by *threepence* per candle; and

For every reduction in illuminating power equal to that of one candle or more the price of *three shillings and sixpence* shall be reduced by *threepence* per candle:

which scale is in this Act referred to as the prescribed scale of illuminating power and price.

29. The maximum price chargeable by a company for gas, according to the prescribed scale of illuminating power and price, shall be reduced according to the amount of impurity with which it is charged, as follows:—

If on any *three* successive days at any time, or on any *twenty* or more days in any period of *sixty* successive days, the amount of impurity in any form has exceeded to any extent the maximum allowed for that form, or the gas has been charged with any amount of sulphuretted hydrogen, the price charged for the quarter in which the last of those successive days occurs shall be less per *one thousand* cubic feet than the maximum chargeable, by a sum of not less than *one penny*.

If in any such case the amount of impurity in any form has exceeded the maximum allowed for that form to the extent of *one-third* thereof, the price charged for that quarter shall be less per *one thousand* cubic feet than the maximum chargeable, by a sum of not less than *twopence*.

If in any such case the amount of impurity in any form has exceeded the maximum allowed for that form to the extent of *one-half* thereof, the price charged for that quarter shall be less per *one thousand* cubic feet than the maximum chargeable, by a sum of not less than *threepence:*

and, notwithstanding anything in this Act, the price chargeable, after the reductions directed by this section have been made, shall be deemed the maximum price chargeable according to the prescribed scale of illuminating power and price.

Reports of Chief Gas Examiner.

30. Not more than *three* days after the end of each quarter the chief gas examiner shall make a report to the Metropolitan Board of Works and the Commissioners of Sewers on the results of the daily testings made in that quarter in connexion with each station of each company, and shall state therein with respect to gas supplied by each company from each station in that quarter—

1. The illuminating power on each day:
2. The highest and lowest illuminating power for the quarter:
3. What is to be taken (as between the company and their customers) as the illuminating power for the quarter, being the lowest illuminating power on any *fourteen* days in the quarter:
4. The amount of impurity in each form on each day:
5. The maximum price chargeable for the quarter.

31. A copy of each quarterly report of the chief gas examiner shall within *two days* after the receipt thereof by the Metropolitan Board of Works or the Commissioners of Sewers be furnished by them to the company.

Payments for Gas.

32. Gas-rents shall be payable at the expiration of *seven* days after the end of each quarter.

33. On each application by the company to any customer of the company for gas-rent the company shall deliver to him in writing or print, or partly in writing and partly in print, a true statement of the illuminating power of the gas supplied by them to him for the then last quarter, and the maximum price chargeable for the same, and the actual price charged, otherwise the gas-rent applied for shall not be recoverable.

Dividends.

34. Each company may pay a dividend for each half year in proportion to the illuminating power of the gas supplied by them in the quarters comprised in that half year, and to the price charged by them for the same, as follows:—

For each half year in any part of which the price charged is the maximum price chargeable according to the prescribed scale of illuminating power and price, a dividend may be paid at a rate not exceeding *seven* per centum per annum:

For each half year throughout which the price charged is less by *one penny* per *one thousand* cubic feet than the maximum price chargeable according to that scale, and so in respect of each further reduction of price by *one penny* per *one thousand* cubic feet below the maximum price chargeable according to that scale, a dividend may be paid at a rate (in addition to the dividend at the rate of *seven* per centum per annum) not exceeding *one half* per centum per annum:

Provided always, that where the illuminating power is less than that of *twelve* candles there shall be no increase of dividend for any reduction of price below the maximum price chargeable according to the prescribed scale of illuminating power and price.

Accounts.

35. There shall be an auditor of the accounts of the companies, being a competent and impartial person, from time to time appointed by and removeable by the Board of Trade.

36. The auditor shall with all practicable speed after the *passing of this Act*, investigate the accounts of the companies, and ascertain and certify the amounts of their capitals, distinguishing share from loan capital.

37. The auditor shall from time to time prescribe a uniform form of books and accounts to be kept by the companies.

38. The auditor shall half yearly audit the accounts of the companies, and if he finds the same correct he shall certify the same respectively, but if any instance he finds the accounts incorrect in principle or in detail he shall require the company to correct the same in such a manner as he thinks right.

39. Each company shall give to the auditor, his clerks and assistants, access to the books and documents of the company, and shall, when required, furnish to him and them all vouchers and information requisite for the purposes of the audit, and shall afford to him and them all facilities for the proper execution of his and their duty.

40. If any company think themselves aggrieved by any act or determination of the auditor, the matter in difference shall be referred to the determination of an arbitrator agreed on between the company and the auditor, or, in default of agreement, appointed, on the application of either party, by the Lord Chief Justice of the Court of Common Pleas; and the reference shall be subject and according to the provisions of The Common Law Procedure Act, 1854; and the decision of the arbitrator shall be final and conclusive; and subject to this provision the companies shall observe and abide by the directions and determinations of the auditor.

Miscellaneous Amendments.

41. All gas supplied by a company to a private customer shall be supplied at such pressure as to balance a column of water *one inch* in height at the exit of the meter in the customer's house, building, or lands supplied.

42. A company supplying gas to public lamps, or the local authority, may at their own expense cause to be affixed to each lamp the instrument known as a street-lamp governor, and the local authority or the company (as the case requires) shall be entitled to have access thereto for the purpose of examining the same; and in case any dispute arises between the company and the local authority with reference to the affixing, operation, or inspection of governors, the same shall be referred to the determination of the chief gas examiner, whose decision shall be final and conclusive.

43. A company shall not charge a higher price per *one thousand* cubic feet for gas supplied to any local authority than the lowest price per *one thousand* cubic feet charged by them at the same time to any other local authority, or to any private customer.

44. Section thirty-eight of the Act of 1860 shall be read as if the Lands Clauses Consolidation Act, 1845, were therein mentioned instead of the Companies Clauses Consolidation Act, 1845.

45. Each gas company shall cause to be marked in figures on the map which they are required to keep by section forty-two of the Act of 1860 the diameter in inches of all their mains or district mains laid under public streets and roads.

46. Where a dispute arises between a company and one of their customers respecting any payment to be made to the company, if the customer deposits with the company, by way of security, the amount claimed by them, it shall not be lawful for the company to discontinue a supply of gas to the customer by reason of the dispute.

Expenses of Execution of Act.

47. The remuneration of the members of the gas board, and of the chief gas examiner, and of the auditor, shall be such as the Board of Trade from

time to time direct, and the sume and all expenses properly incurred by the gas board and the chief gas examiner and the auditor in or about the execution of their duties shall be paid by the companies, and shall be from time to time apportioned by the Board of Trade among the companies in proportion to the nominal amount of their share capitals, and the amount so apportioned to each company shall be paid by the company, on demand, to such fund or account, and in such manner, as the Board of Trade from time to time direct, and shall be a debt due from the company to the Crown, and shall be recoverable accordingly, with costs.

48. The remuneration of the gas examiners and all expenses incurred by them in executing their duties shall be paid by the Metropolitan Board of Works or the Commissioners of Sewers, as part of the expenses of the execution of the Acts relating to those bodies.

Purchase of Undertakings.

49. The Metropolitan Board of Works or the Commisaioners of Sewers may, from time to time, enter into and execute such agreement as they think fit for the purchase by the Metropolitan Board of Works or the Commissioners of Sewers of the undertaking of any company.

50. The consideration to be paid by the Metropolitan Board of Works or the Commissioners of Sewers on any such purchase shall be deemed part of the expenses of the board or commissioners to be defrayed, assessed, and raised by them as in the Acts relating to those bodies provided, and shall be raised by them accordingly, and for that purpose they respectively shall have and may exercise all such powers and authorities as are vested in them respectively under those Acts or any of them with reference to the borrowing of money on the security of rates, or to any matter connected therewith.

Saving.

51. Nothing in this Act shall exempt the companies from the provisions of any General Act relating to gas companies or to metropolitan gas companies to be passed in this or any future session of Parliament, or from any revision and alteration, under the authority of Parliament, of the maximum prices and dividends authorized by this Act.

Costs.

52. All costs, charges, and expenses preliminary to and of and incidental to the preparing, applying for, obtaining, and passing of this Act shall be paid by the Metropolitan Board of Works as the Board of Trade direct.

The SCHEDULES to which the foregoing Act refers:—

THE FIRST SCHEDULE.

Parts of Metropolis Gas Act, 1860, *repealed.*

Section two as far as it incorporates the provisions of the Gas-Works Clauses Act, 1847, with respect to the amount of profit to be received by the undertakers when the gas-works are carried on for their benefit, or imposes any restriction on a company in respect of the rate of dividend;

Sections seven to twelve, both inclusive;

Sections twenty-five to thirty-four, both inclusive;

Sections forty and forty-one.

THE SECOND SCHEDULE.

Description of Burner.

A burner of the kind known as Sugg's steatite Argand burner, of 15 holes, consuming not more than 5 cubic feet of gas per hour, and having the following dimensions:—

	Inches.
External diameter	1·0
Internal diameter	0·5
Diameter across from centre of hole to centre of hole	0·8
Diameter of hole	0·05
Height from gallery rest to top	1·2

And having a glass supported on an ordinary gallery, with or without a perforated disc, the glass having the following dimensions:—

	Inches.
External diameter	2·0
Internal diameter	1·85
Total height	7·0
Height from level of top of burner to top of glass	6·0

HOUSE OF COMMONS.

COURT OF REFEREES.

WEDNESDAY, MARCH 13, 1867.

(*Present*:—*Mr.* SCLATER-BOOTH, *Chairman*; *Mr.* RICKARDS, *and Sir* JOHN DUCKWORTH.)

SOUTHPORT WATER BILL,

AND

SOUTHPORT IMPROVEMENT (WATER) BILL.

Mr. DENISON, Q.C., Mr. RODWELL, Q.C., and Mr. SALISBURY, appeared for the Southport Water Company; Mr. BURKE, Q.C., Mr. POPE, and Mr. BIDDER, for the Southport Improvement Commissioners; Mr. HORACE LLOYD for the Ormskirk Local Board; and Mr. LITTLER, on behalf of Lord Derby.

Mr. H. LLOYD said in the case of the Southport Water Bill he represented the Ormskirk Local Board of Health, who were petitioners against the bill. The Southport Water Company were incorporated in 1854, and in 1856 further powers were given them in respect of capital. They now came before Parliament to extend their limits and to execute further works. One of those works was the sinking of a new well in the parish of Aughton, just within the intended new limits. The local board of Ormskirk objected to these powers being conferred upon them, as the sinking of that new well and pumping water would drain away the water which they were supplying under the provisions of the local Act; and the question was whether that was sufficient to give them a *locus standi*. There were two decisions of the referees court in the last session which appeared to establish conclusively that in such a case as the present there was a *locus standi*, and he apprehended the sole question his friend could raise in the matter was, whether there was some distinction between the facts. The first case was that of the South Staffordshire Water-Works Bill, reported at page 116 of "Smethurst on *Locus Standi*." In that case the promoters came to extend the area in which they were to supply water, and to obtain the possession of lands in Lichfield, with a general power of purchasing, by agreement, other lands therein, and to construct wells and shafts. The bill was opposed by the petitioners, who were trustees under an ancient trust for supplying gratuitously the inhabitants of Lichfield with water, and they were the owners of an ancient well or spring of water, and believed that the promoters' bill would, by pumping water out of the sandstone at a lower depth, diminish the supply of water entrusted to their care. The *locus standi* was objected to on the ground that the "abstraction of underground water, authorized by the bill, ought not to entitle the petitioners to be heard, they having no interest in any underground waters which the company might obtain by boring." Nevertheless, the *locus standi* was allowed. The other case was that of the Cambridge University and Town Water-Works Bill, in which the promoters sought to extend the limits of their district. The bill was opposed by the petitioners on the grounds that they were the owners of certain lands, and that the bill would authorize the promoters to drain the wells and watering places in such lands, and affect the supply. In that case the *locus standi* was also allowed, although it was objected to on the ground that the abstraction of water would not affect the property or rights of the petitioners. The petition of the Ormskirk Local Board stated that the Public Health Act had been put in force in the town, and that the petitioners were constituted the local board of the district. By the 75th section of the Public Health Act, the local board, as constituted under that Act, had power to supply water and to execute the necessary works for that purpose. The petitioners stated that in 1852 they obtained a lease of certain lands in the townships of Ormskirk and Burscough for the purpose of sinking a well or wells, and putting up pumping machinery, to enable them to supply Ormskirk with water; that they expended a large sum of money and entered into numerous contracts for supplying water in accordance with the provisions of the Act. The main paragraph in the petition was "that the works contemplated by the company's bill would interfere with the rights and interests of, and injure the Ormskirk Local Board, and very materially interfere with the supply of water now obtained by the local board from their wells and other sources;" and they stated that they are advised and believe that if the company are allowed to sink wells as proposed by them, the supply of water would be very much prejudiced. That seemed to him at all fours with the cases he had referred to. The objection apparently raised by the company was that, according to the law as now settled, there was no legal right in the supply of underground water; that is to say, of underground water not flowing in a definite channel, but finding its way by percolation through the soil—that it would give them no right to damages at common law and no right to compensation in Parliament. This was a question of vital importance to the local board, because, if their supply of water was diminished, they could have no right to remedy at law or to compensation from Parliament. Under those circumstances, although, of course, it might be a proper question, whether or not the Southport Water-Works Company should have these powers; but it would seem rather hard if the local board were not to be heard against that which was really and truly a very serious interference with what, for all practical purposes, was their property.

Mr. RICKARDS: There were some special circumstances in both of those cases to which you have referred.

Mr. LLOYD said he presumed there were more or less special circumstances, and that the argument of Mr. Rodwell would be to distinguish between the cases. In the present case there were special circumstances entitling the local board to favourable consideration. They had the power of supplying water and executing necessary water-works, therefore they were in the same position as if a special Act had been passed for them enabling them to do so. They were constituted under a provisional order confirmed by Act of Parliament, which was, in fact, the same as if it incorporated all the powers of the Public Health Act, and under that order for 14 years past they had been supplying water from these wells, not for their own benefit, but for the benefit of the district. They were a public body, and they had entered into contracts which they would not be able to fulfil, if the bill sought to be obtained was passed. It was suggested that the area on which the wells were to be sunk was such that it would not affect them. But the answer seemed to be, in the first place, that that could hardly be urged as conclusive, because, in the Cambridgeshire case, which he had cited, the wells were situated at a greater distance from the proposed works, and yet the petitioner was allowed to appear and protect his interest. But secondly, in all cases the question seemed to be one of right, and not one of degree, and the question of degree was surely one for the committee. If there was a fair ground for the allegation in the petition, it was fairly to be assumed that the apprehensions which they really expressed might be realized. Here there was, in fact, a parliamentary title which had been acted upon for 14 years, and acted upon for the general benefit of the district. Lastly, there was this peculiar feature of hardship, that the very people who it was feared by their works would drain away all the water from Ormskirk, did not propose themselves to give one single drop of water to Ormskirk, which was wholly without their limits. They took a point just outside Ormskirk, they executed works of which the probable effect would be to drain all the water away from Ormskirk, and to deprive them of the supply, and they did not, in return, give one drop of water to Ormskirk. This being, as he said, a matter of life and death, an endeavour was made to shut them out from protecting their interest. He submitted that, under such circumstances, there was a fair *locus standi*.

Mr. RODWELL should be believed that this was almost the first case the referees had had to decide upon the *locus standi* of parties where the simple question was raised, whether a company who sought power to sink a well could be objected to by a party in the vicinity who also was using underground water, because all those cases which had been decided, and to which his friend had referred, had special circumstances which might have entitled them to a *locus standi*, and which were all wanting in the present case. He submitted that in principle no *locus standi* must be given in similar cases to this, unless it could be shown that the promoters of the undertaking were interfering with some existing rights, either entering into competition with the existing company, or that they were going to supply water within their limits. But here there were no existing rights whatever. It was admitted that the person who had the soil had a right to sink a well as far as he pleased in that soil; on the other hand, the Ormskirk Local Board had a right to sink their wells, and the result would be the remedy they had in their hands, namely, that if the company sank wells so as to abstract their water, they had the power to sink a well still deeper, and so go on. In this particular case they would bear in mind that the Ormskirk Local Board supplied the Ormskirk district, which was utterly and entirely independent of the Southport district, and, therefore, this case differed from the St. Helen's case, because in that there was a certain amount of competition and invasion of the district already supplied with water by a company. Again, in the South Staffordshire case, it was stated that the petitioners under existing Acts had been guaranteed a quantity of water by the promoters, which was to be brought in a tunnel aqueduct. There were existing rights under previous Acts of Parliament, and a certain quantity of water had been guaranteed to them as a sufficient compensation, but by the bill it was proposed to take the water from the tunnel aqueduct, and the promoters might cease to use such aqueduct. There was the ceasing to use the tunnel aqueduct in that case, and there was a direct interference with the existing rights of the petitioners. There was an existing right interfered with, and he would not contend for one moment that the parties ought not to be heard on their petition, but there was an absence of anything like that in this case. Her

the company merely sought to do that which a landowner had a right to do, and there was no pretence that they would interfere with any privilege or any property which the petitioners had at present in the water. It was simply the fact of their having a certain well three-quarters of a mile off, and the possibility, or he would put it for the sake of argument, it might be the inevitable consequence that they would drain the well; but then they could have no *locus standi* unless they could show an interference with existing rights, or a competition for which there was no pretence in this case.

Mr. RICKARDS said he found by a note that the South Staffordshire case turned very much on the special provisions of the proposed bill.

Mr. RODWELL said that was the very matter he was assuming, and he thought the distinction he had drawn was a sound one. In the South Staffordshire case it was stated that "under existing Acts the petitioners have accepted and received full compensation for all their rights and interests." There the very question arose in the terms "rights and interests." It was a question of right involved. That case was perfectly distinguishable from the present, leaving out the view he suggested—viz., that in all those cases there had been something beyond the bare fact of the parties sinking a well to obtain underground water. In the next case referred to—the Cambridge University and Town Water-Works Bill—the promoters were under an obligation to discharge a certain quantity of water into a brook, which was something quite beyond the mere fact of sinking an underground well. It was stated "that the clause in the bill, relieving the promoters from the obligation to discharge water into the brook, would inflict special damage on the petitioners, as it adjoins their lands and affords at all times a good supply of water to the occupiers of such lands." There the promoters were bound to supply, by way of compensation, a certain amount of water. The *locus standi* was objected to on the ground that the bill took no new powers and there was nothing to show injury, but the bill contained an express prohibition against persons making any new wells, the effect of which prohibition would be to prevent the petitioners from deepening their well, and so they had not that remedy which the Ormskirk people would have in the present case. It would have been a strange thing, if, when a bill came before Parliament, asking for such enormous powers as those, the lunatic asylum were not to be heard against it, if they would be injured. He submitted, therefore, that in the present case there was no circumstance which gave the Ormskirk Local Board a right to be heard, and in the absence of any special circumstance, the bare fact of sinking a well in the vicinity of others who were supplying another district, they being at liberty to do what they pleased in their own district or territory, could not give them a right to oppose the bill. There was no hardship in the matter. Supposing the landowner there chose to sink his well, it was quite clear that no objection could be taken against him. It could hardly be said that the landowner should be deprived of the right to sell his land, and if he sold his land to the water-works company, they had a perfect right to go down into the depth below. That was the law on the subject, and he submitted that his friend had no right to be heard.

The CHAIRMAN said the court would disallow the *locus standi* of the Ormskirk Board.

(*Before Colonel* STUART, *Chairman; Mr.* HASSARD, *and Mr.* BONHAM-CARTER.)

The question of *locus standi* having been disposed of, the inquiry into the merits of the two bills as competing schemes was immediately taken in the adjoining room.

Mr. DENISON, in opening the case of the promoters, said the Improvement Commissioners who had come forward with another scheme, would, by the time the powers they sought were conferred upon them, have ceased to exist, and have transmitted their functions to a municipal corporation, which a recent charter had called into existence. One of the many questions before the referees would be whether these moribund commissioners were to carry a bill through Parliament, and to obstruct the existing company in extending their works. In the Consolidation Clauses Act there was a clause which had an important and decisive bearing upon this question. The 75th clause in the Act of 1848 gave a Local Board of Health power to supply their district with water, or to purchase or lease the works of existing companies, upon terms to be settled upon by arbitration. In the Act of 1858 again, power was given to a Board of Health absolutely to purchase with the consent of three-fifths of the proprietary the property and rights of an existing water company, and if the Improvement Commissioners wished to take the supply of water into their own hands, this was the course which they ought to have pursued, as prescribed by Act of Parliament. Before going into the merits of the bill, he would just call attention to the petition of the Improvement Commissioners. They stated that the population of the town had increased from 4700 in 1854 to nearly 18,000 people. Now this was one of the main grounds upon which the promoters were now seeking for powers to extend their works. Since the formation of the company in 1854 they had gone on increasing their works, raising more capital, laying down more pipes, and though they had not yet exhausted the whole of their available capital, yet they thought the time had come when they should make arrangements for a general enlargement of their powers. In 1854 the company met with considerable difficulty in raising the required capital, for although the town of Southport was anxious for a supply of water, they were not willing to furnish the money for the purpose, and the company were obliged to get money elsewhere. Then the petition stated that, by the Act of 1865, the commissioners were incorporated for the general improvement of the town. It seemed, therefore, that they were about to die in their infancy, for the town of Southport had been recently incorporated by charter, and the commissioners were holding office only until their successors were appointed. One of the objects of the proposed bill was to get a new source of supply, and a much better supply than they had at present. Speaking in general terms, the water the company now provide contained 20 degrees of hardness, while the water from their new source would not have more than half that hardness. This new source of supply was close by Ormskirk, within three-quarters of a mile of the existing water-works there. The Ormskirk people said their supply was very good, but they were afraid the Southport Company would injure them. The referees in the other room had come to the conclusion that there was nothing in that objection, and the *locus standi* of the Ormskirk Board of Health had been decided against. They went on to say in their petition, that in 1865 they proposed to take powers to enable them to acquire by agreement the undertaking of the water company, but that, in consequence of the opposition of the company, they were compelled to abandon their intentions. They were opposed because they could have obtained the necessary powers under the existing law. Then they said great inconvenience had been suffered by the inhabitants of the district, and that it would be for the public benefit that the supply of water should be in the hands of the local authorities, and they had, therefore, introduced a bill of their own, and proposed to obtain their supply from Ormskirk. In this respect the competing schemes would be on a level as regards the quality of the water, for in both cases it was proposed to obtain it from almost the very same source. Having disposed of these matters, he would now call attention to the engineering and physical circumstances of the bill. He might first state that the rival scheme only proposed to supply the borough of Southport proper. On the other hand, the existing company already supplied the township of Scarisbrick and the township of Birkdale, and they proposed to extend their works in the direction of Halsall. The preamble of the bill recited the increase of capital, which they had the power to raise to the amount of £50,000; and while speaking of capital, he might say something about dividends also. For some years they paid no dividends at all. In 1862 they got as high as 5 per cent., and in the last two or three years they had reached the parliamentary maximum of 10 per cent., which it was known they could not exceed. Anything earned beyond that amount must go to the benefit of the ratepayers in the shape of a reduction of charge. Then the body of the bill described the works intended to be carried out, which the engineer would speak to more particularly, and of course consistently with that there was the power to raise more money. At present the supply was equal to 20 gallons per head per diem, and when he told the court that there were no manufactures in the case, they would see that that was a very liberal allowance. Yet, by the new works, it was proposed that that supply should be increased. With this brief outline of the case, he would now proceed to call his witnesses.

William Harper, Esq., examined by Mr. DENISON.

I have been secretary and law-clerk to the water company since its formation in 1854. I think the population is understated by the commissioners: they have taken the resident population. Southport is a watering-place, and in the summer we have a great many visitors, so that, instead of taking five persons as the average for each house, I think it ought to be seven. We had great difficulties in raising the required capital in the first instance; the commissioners gave us every support except pecuniary support, and we had to go outside the town to get the shares taken up. The original capital was £20,000; it has been increased to £50,000, of which £38,000 has been raised—£34,000 on shares, and £4000 on mortgage. The present bill proposes to raise an additional capital of £40,000, with the usual borrowing powers. The quality of the water is very fair; I think it is about equal to the quality of the water in London. It is about 20 degrees of hardness. It is a nice, clear, pleasant-drinking water; but it is hard for washing. There is no source of contamination, because it comes from a deep well in the sandstone. Our supply on the 22nd of December was 434,000 gallons; that is about 28 gallons per head per diem for the resident population. In the summer there is a large quantity of water applied to watering gardens. With respect to the Charter of Incorporation, it was signed on the 28th of February, and it was received in Southport with ringing of bells and great demonstrations of joy. There is a great difference of opinion as to the propriety of the commissioners taking the supply into their own hands.

Mr. HASSARD asked if the Improvement Commissioners were defunct.

Mr. BIDDER said all their powers would be transferred to their successors, the Municipal Town Council, who would be elected six months hence, under the powers of the newly acquired Charter of Incorporation.

Mr. DENISON said the commissioners were seeking to legislate for their successors, who would be elected by a different constituency.

Examination continued: There have been conversations, but no negotiations between the water company and the Improvement Commissioners, with regard to the purchase of our works. We believe they intended to insert a clause for compulsory purchase, but we objected to it, preferring to remain as we are, and to leave the question of purchase to market ouvert. For many years we paid no dividend; then we paid one-half per cent.; then we got up to 5 per cent.; and we are now paying 10 per cent. The average dividend paid since the formation of our company has been 2½ per cent. per annum.

Cross-examined by Mr. BIDDER: The company commenced proceedings towards promoting the present bill on the 14th or 15th of November last, when the usual parliamentary notice was given. They have been constantly enlarging their works, and are contemplating further enlargement. The question, however, of going to Ormskirk for a supply of water has been under the consideration of Mr. Hawksley and myself for the last two or three years. There have been complaints of deficient supply from householders situated at the end of the mains, in consequence of the occupants of the intervening houses drawing off so large a quantity for watering gardens in the summer months. I have heard of no complaints to the effect that there was not water to flush the drains. I know that the question of water supply was taken up by the Improvement Commissioners in consequence of complaints of deficient supply, and the present bill is the result. Complaints have been made with respect to the water-closet supply. One complaint, made by Mr. Holbrook Gaskell, was found to arise in a defect from his own apparatus. Mr. Lake's complaint was also found to be caused by a defective ball-tap. I know nothing of the handbills which have been posted in the town upon the subject of the water supply—these little parochial disputes I take no notice of. Our existing wells are 150 feet deep. The commissioners have asked permission to take a sample from the Aughton bore-hole, which we have refused to grant them, because the water has been standing in the new iron pipes for several weeks, and of course it would not afford a fair sample. But if they will pump the water clear of the pipe, then they are at liberty to take a sample. We have also refused to let them have a sample from our existing wells, because we do not think it right to place weapons in their hands. I believe our present source would supply 1,000,000 gallons a day; but the quantity supplied is limited by the size of the pipes. We intend to substitute the new source of supply entirely for the existing one, and we shall lay down a larger main, and there will be greater pressure, so that all cause of complaint on this head will be removed. We supply in Birkdale 195 houses; in Scarisbrick, 40 or 50; it is a small agricultural parish.

Thomas Spencer, Esq., examined by Mr. RODWELL.

I am an analytical chemist, residing in London. I have had considerable experience in analyzing water, especially in the district in question. In 1854 I was engaged to analyze the water supplied to Southport. No. 1. Analysis was made in 1854; the water was taken by myself from a pump in the town, on December 12th. The solid residuum in a gallon was 54·10 grains; the organic matter was 5·50 grains; the hardness, measured by Clarke's scale, was 29 degrees. The average hardness of the water taken from various pumps, in 1854, was 31 degrees; the average solid contents 61 grains per gallon, and the average organic matter was 6·72 grains. I gave evidence before the committee in 1854, and produced that analysis. I went to Southport about three or four months ago, to see over the water-works; and within the last fortnight I have made an analysis of samples of water taken from the reservoir and sent to me, marked S. R. The solid residuum is 28·20 grains; the organic matter 0·30 grain; the hardness 20 degrees, which is reduced by boiling to 13 degrees. I also received a sample from the Aughton bore-hole, marked A.B. The solid residuum in a gallon is 13·60 grains; the organic matter 0·36 grain; the hardness 10·4 degrees; after boiling 7 degrees. These samples are here, and I produce them. The

old water is twice as hard as the new water, from which I infer that the new bore-hole is a better one than the present. Both waters come from the sandstone, no doubt. I think I can account for the difference of hardness. The worst water comes from the keuper sandstone; the best water comes from the mottled sandstone. The old well lies close to a bed of the keuper sandstone; the new bore-hole is in the variegated sandstone. The keuper sandstone is a good bearing sandstone, but the deeper you get into it the less the supply of water; whereas the variegated yields an unlimited supply. We had an illustration of this in Liverpool. Wells sunk in the keuper sandstone have gradually gone dry, and whenever they have gone deeper they have found the water worse; but whenever they have gone into the mottled sandstone there they have always found an unfailing supply. The quality of the water from the two sources is also different; one is twice as hard as the other.

Cross-examined by Mr. BIDDER: The depth of the new bore-hole is 235 feet, and I have no doubt it will yield a sufficient supply. The water supplied in 1853 was not fit for domestic use: I consider the water at present supplied is good for domestic purposes. The only objection to it is the hardness, which renders it bad for washing.

Mr. BIDDER [exhibiting a pipe coated internally with a deposit] asked whether witness thought that water producing such a deposit was objectionable for domestic purposes.

Witness: The deposit consists of a mixture of carbon and sulphate of lime. Water that would produce that in a short time would be objectionable, but the specimen produced must have been the work of years. It would partly depend upon the temperature. I have never seen such an instance as this before, and yet I have had to do with worse water.

Mr. HASSARD: It is a well-prepared specimen.

Witness: It seems so. The witness then explained the process he pursued in making the analyses of the water, and stated that the proportion of protoxide of iron was under one grain.

Re-examined by Mr. RODWELL: The Aughton water is a "very much better" water, and quite fit for domestic purposes.

By the REFEREES: I do not know if the samples were specially filtered before they were sent to me. The filtering at the reservoir reduces the hardness of the water a little.

Mr. *Harper* recalled: I saw all the samples taken at the reservoir and at the Aughton bore-hole, and they were forwarded to Mr. Spencer just as they were taken, without being filtered at all.

Cross-examined by Mr. BIDDER: I have specimens taken from service-pipes, but I have not got them here.

Mr. *Thomas Livesey*, examined by Mr. RODWELL.

I am owner of a quarry at Scarisbrick, and proprietor of the Royal Hotel, Southport. The population and buildings have increased very much within the last two years. I live near the water-works, and am a director of the company. I made the bore at Aughton myself. I went down to a depth of 235 feet; it took two months to sink the bore-hole. I have frequently examined specimens of the water. As landlord of the hotel, I have never had complaints from visitors respecting the quality of the water at present supplied. The new water is much softer, and, I have no doubt, it will be prized by the inhabitants. There is no doubt that we require an increased supply. In sinking the bore, very little water was obtained until we got down 230 feet, and then we found an abundant supply.

Cross-examined by Mr. BIDDER: I began to bore about the beginning of November.

Thomas Part, Esq., cross-examined by Mr. RODWELL.

I was solicitor to the late Mr. Scarisbrick. I took an interest in the water supply of Southport previous to 1854. I had communications with various commissioners on the subject of a better supply, but I do not know that I ever made any formal representation to the board. In my communications I told them that Mr. Scarisbrick would place at their disposal every facility for obtaining water. I suggested that it was very desirable there should be a better supply, and that I thought it ought to be in the hands of a public body. It was brought under the consideration of the board, but they declined to entertain the proposal. When the present water company took the question up, the commissioners, I understood, supported them. Until the measures were taken to promote the bill of the present session, I am not aware that the commissioners have taken any steps whatever to afford a supply of water. I think the water company may be entrusted with the increased powers they seek, judging from the way in which, to my knowledge, they have treated the public. I have been a director of the company from the first, and as the agent of Mr. Scarisbrick, I was requested to join the board. I do not think it is fair to a company who have, hitherto, run all risks to take the supply out of their hands, especially as, for many years, they were without a dividend, and there having, as far as I am aware, been no complaints made against them.

Cross-examined by Mr. BIDDER: I believe the present bill is brought here, not in self-defence, but in consequence of representations made to the company and their desire to furnish a better supply of water. The subject was entered into long before November last, when notice was given, though the scheme itself was brought forward after the intention of the commissioners to go to Parliament was discussed. I am not aware that the commissioners endeavoured to treat for the purchase of our works in 1865, or that any application of the kind was made. I do think it would be hard upon the company, after the risks they have run, that the thing should be taken out of their hands. The question of the commissioners taking their works, and compensating them for the same, is a question of degree. It is a subject that ought to have been arranged before coming to Parliament. But if provision is made giving a liberal price for the property, as they now possess it, and looking to prospective advantages, I should see no objection to it. I am not sure that it is advantageous to the public for works of this kind to be in the hands of or under the control of a corporation.

Mr. *Ralph H. Heys*, examined by Mr. RODWELL.

I am manager of the Royal Hotel, and I can say that the supply of water, and the way in which the water company manage their works, have been satisfactory. With regard to the opinion of Southport, the inhabitants are divided. I think the majority is in favour of the company. No doubt, there are many who think the commissioners should have the control of the water supply. So far as I have seen, the inhabitants are satisfied with the company.

Cross-examined by Mr. BIDDER: We have not to my knowledge ever suffered from insufficiency of water at the hotel. I have been manager two years. I have taken no part at public meetings on the subject of the future water supply.

Mr. *Charles Barrow*, examined by Mr. RODWELL.

I reside at Southport, and am a dentist. I have resided there four years. During the two years I occupied a house we had a pump; the other portion of the time the houses where I lodged were supplied by the company. To the best of my knowledge the supply was satisfactory. I have never heard of any dissatisfaction until a report of an analysis by the commissioners was circulated. I am a commissioner myself, and as a commissioner endeavoured to ascertain the feelings of the inhabitants. There are a large number against the commissioners proceeding with their bill. The opinion of the majority is that the supply will be better for the town, financially, in the hands of the company than in the hands of the commissioners, and I endorse that opinion. I was requested to present a remonstrance to the commissioners, the purport of which was against their taking the measure in hand. The remonstrance was signed by 1384 ratepayers, out of 3000, and the signatures were obtained in the course of a fortnight's canvassing. There were a great many neutral.

Cross-examined by Mr. BIDDER: I became a commissioner in September last, and I found that the commissioners had been considering the subject for some time; that they had appointed committees and made inquiries; but I do not know that they made any analysis at the time. I am not aware that there was any talk at that time of the company extending their works. The resolution of the commissioners in favour of applying to Parliament was passed by 18 to 1; I was the one. It was afterwards confirmed by 16 to 3. After that resolution was passed, a Remonstrance Committee was appointed to take legal steps against the bill. The first meeting was called by advertisement, and about a dozen gentlemen attended, among whom were Mr. Davenport and Mr. Horton. They constituted themselves into a committee, and they appointed canvassers to get signatures to the remonstrance. There was a placard circulated in reply to a paper that was issued by the commissioners, the object of it being to induce the people to sign the remonstrance. A vote of censure was passed by the board, the exciting cause of which was that I differed from the commissioners. There were 1384 signatures of inhabitants to the remonstrance obtained by four canvassers in little more than a fortnight. We took the signatures of ladies who were ratepayers, but not those of the wives of ratepayers where their husbands were not at home. Considering that there were a great many of the ratepayers neutral, the numbers who did sign would, I think, show a majority.

Re-examined by Mr. DENISON: The water company had nothing to do with the remonstrance. Our opinion was that the commissioners ought to leave the question alone. The chairman of the commissioners said that the number of non-voters who signed was 180.

Thomas Hawksley, Esq., examined by Mr. DENISON.

I am the engineer of the water company, and constructed their works, at Southport. There is only one source of supply from the new red sandstone. There are many large wells of several feet diameter, which go down into the rock. We have laid down 20 or 22 miles of pipes altogether, including Birkdale. The inhabitants of Halsall will be glad to take the water, because in the lower levels the water is bad, and in the upper levels it is difficult to get. I have made no analysis of the water myself, but I know that the process adopted here takes out the peroxide of iron. The London water is, on the average, 14 degrees of hardness; at Southport it is 20 degrees. In connexion with the new works, we are going to make a large well and to erect two large steam-engines, so that the quantity of water that can be transmitted will be 1 million gallons a day. The quantity lifted will depend upon the demand. As soon as we have got the new source of supply into operation, the old supply will be discontinued; except that the wells will be kept to supply the tank on the tower, in case it should be wanted at night. We shall be able to give 25 gallons per head; but Southport not being a manufacturing town, 20 gallons ought to be sufficient. With regard to the estimates, we have, in the first place, five acres of land, the price of which I am not prepared to give. It is part agricultural land, and part clay field. The whole that we want for surface works is two acres. The first item for works is engines and engine-house; we shall want new engines of 40-horse power. We have two already, which will be capable of being removed to aid there; or if they are not wanted they can be sold. The cost of the engines and house will be £5000. The next item is the cost of sinking the wells, £2500. The well will be about 100 yards deep, but it may be considerably less. I propose to carry it to a greater depth than the present bore-hole. We shall then want a small pool for water to supply the engine; the cost of that will be £250. Then we shall have a cottage and an enclosure wall, costing altogether about £600. We shall have a service reservoir, the cost of which will be £4500. There will be a large main, 18 inches at first, until it reaches our existing main, and as we shall use both mains, we shall then reduce the new main to 13 or 14 inches. The cost of that main will be £12,310. This gives a total of £25,920, and adding 10 per cent. for contingencies, it will bring up the amount to £28,540. In the bill we propose to raise £50,000. I am satisfied that these estimates are sufficient.

Mr. DENISON: Do you know of any instance of Parliament having allowed a public body to enter into competition with a private company?

Witness: I believe there is no such instance where Parliament has allowed the ratepayers money to be expended in competition against private capitalists. I believe there is no such instance on record. And that applies to gas as well as to water; it has often been attempted but never sanctioned. The competing scheme, if granted, will involve a double set of mains, and a double pulling the streets to pieces; moreover, the commissioners will have to commence *de novo*, while we already have the works in operation. The source of supply for the two schemes is substantially the same. If we enter into competition we must fight fiercely; the consequence will be that the ratepayers will have to provide the capital on the security of their rates, and for which they must necessarily pay interest; while the company will have to work without a dividend—that is all the loss they will sustain. The great difference between works in the hands of public bodies and of private companies is this—that in the case of private companies the ratepayers are always urging increased expenditure, which does not come out of their pockets, and in the case of public bodies they are always for restraining expenditure. The general result is that the public is better supplied by companies than by a corporation.

Cross-examined by Mr. BIDDER: The last time we met was on the Birmingham Water Bill. The Birmingham Corporation had nothing to do with that bill. It is not a general thing for corporations to take up water-works. With regard to the question of distance from the Ormskirk supply, by the two schemes, the advantage, I think, is in our favour. The new reservoir I propose is a tower with a tank at the top. I do not think the parliamentary plan shows the scheme in that particular, nor what it ever was. The deposited plan shows a reservoir, not a tower; it was put there by a mistake, and I corrected it myself. It was lithographed at Liverpool, and when I saw the proof sheets I telegraphed to Liverpool to make the correction, but they did not understand the telegram, and the correction was not made. There should have been a similar tower to the one we have now. But it is of no consequence, because the error can be altered under Standing Orders, or within the limits of deviation.

Some discussion ensued upon the point whether the witness was justified in departing from the deposited plan, and proposing a totally different kind of reservoir. The referees at length decided that, in their opinion, so long as the alteration could be effected for a sum within the estimates, there was no objection to it.

This was the case for the promoters.

Mr. BIDDER said, in the absence of Mr. Burke, he should reserve any statement on behalf of the Improvement Commissioners, and proceed at once to call his witnesses.

Mr. *Craven*, examined by Mr. POPE.

I am a surgeon, and have been practising in Southport about ten years. I have been a commissioner about a year and a half. I am sanitary inspector of Southport. About four years ago I called the attention of the town to the condition of the water supply. I found the water very unsatisfactory. I examined the water from six or seven wells in the centre of the town. I analyzed the water and I found it unsatisfactory. The waterworks were established when I went to Southport. Three or four years ago there was an epidemic among the poorer classes. I was instructed to examine and report, and I found fever prevailing in Ecclesfield and part of Birkdale. I examined the water in the wells, and found it exceedingly bad, from percolations through the soil from sewers and drains. In consequence of my report the Board of Health ordered the pump-handles to be taken off. Last summer cholera prevailed in one or two out-districts, and I was appointed medical adviser to the Diseases Prevention Committee. I thought I could trace a connexion between the disease and the water of the wells. I gave orders for the wells to be stopped up, and as a consequence the disease considerably abated. During the last thirty years I have made sanitary science a special object of study, and have acted in connexion with the corporation of Leeds in the matter. In my judgment it is desirable that some compulsory powers should be given to the governing body with regard to the water supply. In going round the town I have complained of the smell of water-closets, and I have invariably been told that it was because they were short of water. The commissioners have the control of sanitary matters, and they ought, in my judgment, to have control of the water supply as a sanitary measure. Seven years ago I proposed that every house should be supplied at a certain rental, and that a stand-cock should be put up for every group of so many cottages.

Cross-examined by Mr. DENISON: I have seen Dr. Letheby's opinion, which is rather adverse to my view regarding the quality of the water. I am not aware that the commissioners have power to compel the water company to flush the sewers. I have written letters and leading articles on the subject in the newspapers, and given lectures, in which I have advocated the purchase of the water-works by a public body. In my opinion, your new source of supply is not the same as ours; it is harder, and contains a larger amount of solid matter.

Mr. *T. B. Hodgkinson*, examined by Mr. POPE.

I have taken various samples of water at Southport for purposes of analysis, and I forwarded them to Dr. Frankland. The bottle labelled No. 1 contains water taken from the Ormskirk well. "B. B." is the water taken from the new bore-hole of the Improvement Commissioners. No. 2 was taken from Appleton's well, which is about 200 yards from the Aughton bore-hole of the water company. No. 3 contains water supplied to Southport after passing over Mr. Spencer's filtering-bed. I took these samples on the 6th of March.

Cross-examined by Mr. RODWELL: Appleton's well is about seven yards deep.

Dr. *Frankland*, examined by Mr. POPE.

I am professor of chemistry at the Royal College of Chemistry. I have had considerable experience in the analysis of water. I received the samples of water sent by Mr. Hodgkinson. I did not know where they came from. Sample No. 1 contains 9·24 grains of solid matter per gallon; 1·26 grains of organic and other volatile matter. The amount of oxygen required to oxidize this matter was ·00784 grains. The hardness was 3·94 degrees, and on boiling half an hour, it was reduced to 3·15 degrees. I found this water had no traces of sewage or contamination, and altogether was a water well fitted for domestic use. Sample No. 3 yielded 28·59 grains of solid impurity, per gallon; 3·92 grains of organic and other volatile matter, which required 0·02 of oxygen to oxidize it. Its hardness was 11·96 degrees, which, after boiling, was reduced to 11·35 degrees. This water contained decisive evidence of sewage and manurial matters. No. 3 is a water not at all fitted for the supply of a town. Sample B. B. contained 9·4 grains of solid impurity; ·98 grains organic matter, requiring ·0078 grains of oxygen to oxidize it. Its hardness was 4·86, reduced in boiling to 3·73 degrees. The hardness was ascertained by Clark's test. This water was colourless, transparent, and inodorous, and a good water for domestic use. I heard the evidence of Mr. Spencer, but I could not be quite clear as to which sample he was referring to. B. B. is a softer water than that proposed to be supplied by the water company.

Cross-examined by Mr. RODWELL: If Mr. Spencer's analysis of water taken from the Aughton bore-hole be correct, that is a very good water.

THURSDAY, MARCH 14.

S. Boothroyd, Esq., examined by Mr. POPE.

I am chairman of the Improvement Commissioners of Southport. I am familiar with the requirements of the place and the wishes of the inhabitants. A very large majority of the commissioners are in favour of the scheme. I have never met with a single individual, with the exception of three or four of the commissioners, who has not expressed the opinion that the supply of water should be in the hands of a public body. Twenty-two or three were present at the meeting when this bill was discussed. Three or four commissioners are decidedly against the scheme; the remainder are either decidedly favourable to it or are neutral. I should say there are twenty in favour of it. In my judgment as an inhabitant, and being acquainted with the wants of the district, I should say it is an important matter that those who have the control of the sanitary arrangements of the town should have control over the supply of water. Southport being situated on flat ground requires that great attention should be paid to its sewerage. As a commissioner, I have known inconvenience to result from the want of control over the water supply in that direction. The existing company, as regards their mode of supply, and their capacity or inclination to supply, have not been adequate to the sanitary wants of the town.

Cross-examined by Mr. RODWELL: I am aware of the remonstrance memorial being got up. I do not say that there is a difficulty in finding persons who are opposed to the commissioners being vested with these powers, but I have not met with a single individual except the parties I referred to who have not expressed the opinion I have stated. I declined, as chairman of the commissioners, to call a meeting of the ratepayers on the subject, because the effect of such a meeting would have had no influence upon the future of the bill. The public voice on the matter is represented by the commissioners. The commission will cease to exist in June; there will be another constitution, but essentially the same parties. I do not think the anticipated change an additional reason for ascertaining the public opinion. I was examined in favour of the bill in 1854. I first became impressed with the importance of taking this matter into our hands when I found the wells were yielding water altogether unfit for public use. That was three or four years ago. I know the objects of the bill are to supply better and more water. The present company have not given us value received for our money as water consumers. I myself have had a sufficient supply as to quantity but not as quality.

Mr. HASSARD: Did you ever as a body call upon the company to improve the supply?

Witness: I am not aware that we have taken any action in that way; but as regards the extent of supply, I happen to be connected with the Victoria Hotel Company, a large hotel there, and the supply there has been inadequate altogether—very intermittent and very uncertain.

Mr. RODWELL: That would be an additional reason for the company coming for the powers they seek under this bill.

Re-examined: I wrote to Mr. Barrow, giving him my reasons for not calling the public meeting. May I be allowed to say, whilst I am here, that when we applied to Parliament in 1865 for an Improvement Act, we proposed taking powers for the purchase of the present company's interest in their water-works; we were opposed by the Water-Works Company in Parliament, and given to understand that if we retained that clause the company would not be called together to decide whether they would sell the works to us or not; the three-fifths clause would not have been in fact put into operation, and we should have had no result at all.

Mr. HASSARD: What do you mean by "powers to purchase"? Do you mean compulsory or permissive?

Witness: Permissive.

Mr. SALISBURY: I was counsel then to the Southport Company. Of course I do not want to contradict in terms what the witness has just said, but I beg to say, so far as I was concerned, I have no recollection of anything of the kind taking place. We simply said, "We must oppose this bill unless the clause is struck out." The clause was taken out, and there the matter remains.

Mr. *Walter Smith*, examined by Mr. BIDDER.

I am a resident in Southport, and an owner of house property there. I am a member of the board of commissioners. The present supply of water is not what it ought to be by a good deal. I think it would be decidedly the best to place the water supply in the hands of the authorities of the town. I believe that nine-tenths of the inhabitants of Southport that take the water of the company would be glad if the management of the water was solely in the hands of the commissioners. A considerable number of houses do not take the company's water; they confine themselves to using their own bad well water, and nearly to a house their names are in the remonstrance. The surface water is considerably deteriorated by the drainage. I believe about 1000 houses are supplied from the well water. I remember the negotiations that took place in 1865 with the water company. There have also been recent negotiations with the water company.

Cross-examined: I should not be willing to take the water which the company propose to give under this bill. I would sooner take it than what we get now, but I would sooner take Ormskirk water than that. I have heard it stated repeatedly that a majority of the inhabitants are in favour of the commissioners scheme. The public have never been asked for a requisition in favour of our scheme. Many of those who signed the remonstrance have expressed their regret, because they were induced to do it by a false representation.

Re-examined: The commissioners in 1864, and before that time, were anxious to get a better supply. With that purpose they then wished to take powers to purchase the works of the company. I believe the water company would not be in Parliament now unless the commissioners had resolved to come on their own account.

The CHAIRMAN: Are we to understand that the other petitions are withdrawn?

Mr. BIDDER: I am told that the Ormskirk petitioners are to be considered in the room, but Lord Derby's petition is withdrawn.

Mr. *Hodge*, examined by Mr. BIDDER.

I am an architect and builder, resident in Southport, and the owner of of houses there. I also act as agent for property in the town. My attention has been called to the question of the water supply, and I am of opinion that a better supply has long been needed. I believe the control of it should be in the hands of the governing body of the town. The water company have given a very inadequate supply, and complaints have been made to them on the subject without effect.

The CHAIRMAN: The bill is an answer to that, so far that the company are trying to remedy it.

Witness: It is very desirable that the houses at present supplied with well water should have another supply. I believe the large majority of the town are in favour of the commissioners scheme.

Cross-examined by Mr. RODWELL: My houses are supplied by the company. We could not get well water, and I was compelled to have the company's water on for my tenants, though it is scarcely fit to drink. One day the water may be tolerably clean, but another day it is thick with mud. I have complained to the company, but not in writing. I have advised some of my tenants not to pay the water-rate. The collector has never been in collision with me or my tenants to my knowledge.

Mr. *William Robson*, examined by Mr. BIDDER.

I am an ironmonger in Southport. I have a good knowledge of the town and the history of the water supply. The company have not been ready and willing to meet my wants in respect of water. In April, 1864, they refused to supply me because my next door neighbour did not take the water. I was living in a semi-detached house. They do supply me now. The water supply should be most decidedly in the hands of the authorities of the place. They ought also to have it for sanitary reasons. There are a large number of the poorest class of houses not supplied by the company. They were compelled to put the water on in these houses during the time of the cholera because the supply was so bad.

Cross-examined by Mr. RODWELL: They were three weeks before they would put my water on. The main and the service pipes were laid, but they did not connect it with my house. I laid down my own service-pipes to their main-pipe.

John Lawson, Esq., C.E., examined by Mr. BIDDER.

I was instructed by the Improvement Commissioners last summer to consider the question of improved water supply for the town. I examined the neighbourhood to ascertain the best source for the supply. I fixed upon the spot close to the Ormskirk works. Borings were made by the Ormskirk Local Board. I propose to construct a well, pumping station, a reservoir containing about 3 million gallons, and a water-tower at Southport. The site for the reservoir is of such a height as to enable us by the pressure to supply the highest houses in the town. Our estimate for the whole of the works is £50,000. Reservoir, £3600; the well and works connected, £3500; pumping works, £7000; rising main and pipes, £17,220; water-tower and tank, £9000; road, cottage, and other works, £500; the remainder is for land and contingencies. That estimate is adequate for the whole of the works, and will enable the Improvement Commissioners to take to

Southport a sufficient supply of water. The estimate does not include the distributing pipes within the town. There would be no difficulty in using the existing mains of the company. I do not contemplate laying duplicate mains through the towns. I assume that we should purchase the works of the company. I heard Mr. Hawksley's evidence about the reservoir. Its capacity would be 2½ million gallons. I think it is desirable to provide something like 3 million gallons. I calculated the amount of Mr. Hawksley's reservoir. It would take 70,800 yards of earthwork, costing £4200. Part of it would have to be puddled, 5480 yards at 6d. extra, £137. Pitching of the slopes, 3682 square yards, at 2s., £368 4s. It would take 7 acres, 7 yards deep, £560. The total is £5490. That is taking Mr. Hawksley's own figures. I think it would cost £6021. I take the same number of yards in the earthwork, but there is a difference as to the quantity puddled. I put the pitching of the slopes at 3s. a yard. According to Mr. Hawksley's own figures, he is £1000 wrong, and according to mine £1500. The tank would only contain a quarter of a day's supply. It is quite evident he must pump on Sunday, or the town will be without a supply.

Cross-examined by Mr. RODWELL: I should think the distributing-pipes might cost £12,000. I am not aware that the bill contains compulsory powers to take the pipes of the company. If we cannot make any arrangement with the company, we shall have to lay down duplicate pipes. I should suppose the company have 14 or 15 miles of distributing-pipe.

Mr. *Charles Hill*, examined by Mr. POPE.

I am solicitor to the Ormskirk Local Board. An arrangement has been made with the Improvement Commissioners. The Ormskirk Local Board agree to the preamble.

Cross-examined by Mr. RODWELL: I am not aware that by the Public Health Act the agreement must have the assent and seal of the board, five members being present. I presented a petition against the bill. I am not able to say whether the allegations of that petition are correct. With the consent of Lord Derby, the commissioners have agreed to purchase our pumping works. We shall still supply our district. The agreement was settled in the country yesterday by the board. I have not seen it.

By the REFEREES: The agreement is to be carried out by clauses in the bill.

Mr. BURKE addressed the court in support of the bill introduced by the commissioners. He said they were not in the position of a private company coming before Parliament to serve personal interests; they were parties representing public interests in the town of Southport, and the only interest they had was to do the best they could for the town; they might be considered as the town. It was impossible to bring forward every individual inhabitant of the town, but when they found, as in the present case, that the town being represented by 27 commissioners, at a meeting of 19, 18 were in favour of the prosecution of the bill, and only one against it, they might fairly assume that those 18 gentlemen did represent the majority of owners and occupiers of property in that town. The commissioners did not desire to act unjustly to other parties, and he (Mr. Burke) hoped he should never be employed to advocate a case of competition, at the risk of the ratepayers, with a private company. They had not proposed to purchase the property of the water company, but if the parties desired to sell that property, the commissioners were prepared to have clauses introduced into the bill, unless such an arrangement could be effected. And the precedents were numerous in which Parliament had dealt with private companies under that footing. At Liverpool the corporation brought in a bill in the same manner as this was brought in, to ask that they might be allowed to supply the town. Of course the private companies rose up in arms, and the point was at once conceded that the corporation must buy them out on fair arbitration. That was the provision in Liverpool, Manchester, Glasgow, Birkenhead, Rochdale, and various other towns. The only question the court would have to inquire into was, how was it best for the town of Southport that the future water supply should be given? They were in this fortunate position, that both parties agreed there must be a new supply. There was a general acquiescence that the water supply was not only defective in quantity but also in quality. The question was, who should give the new supply? The town itself was increasing rapidly, the commissioners were vested with powers for the management of the town; they supplied the gas; they erected markets, and had the whole control of the sanitary arrangements, and it did seem that if those gentlemen had been found competent to exercise such functions, they were clearly the parties most competent to conduct the supply of water. There might be some objection to the commissioners embarking in a speculative undertaking like the supply of gas, at the risk of the ratepayers, but in the supply of water there was no risk whatever. It was an article which they could compel everybody to take. They proposed to have a compulsory rate, and to compel every person to take water, and very properly so, for how otherwise could they satisfactorily attend to the sanitary condition of the town? It was no novel proceeding, but was consistent with the public requirements, and if the tax was for the beneficial purposes of the community at large, it was one to which Parliament would give its sanction. The town, which a few years ago was a simple village, now had 17,000 inhabitants, and had obtained a Charter of Incorporation. It was really amusing to find the allegation in the petition of the other side, that, in point of fact, the commissioners had no right to bring in this bill because their powers were to be transferred to a corporation. But by the Act itself it would be found that the commissioners would transfer their powers,, and the corporation would be in the room of the commissioners. The only question was, would the town council, elected under the Corporation Act, have a different interest as representing the property of the town from those gentlemen who now represented it? He would assume the fact that they would fairly represent the town, and most unquestionably those gentlemen who now held the office of commissioners did fairly represent the interest of the town, and the court had been told that the vast majority of the town were in favour of transferring from a private company the powers which they now exercised, and placing them in the hands of a corporate body. He would not raise any great question as to the quality of the water. So far as the analyses went, they were in favour of the commissioners—so far as the hardness or softness of the water was concerned. It was only a question of a few degrees, but such as it was it was in their favour. They desired to have the best water that could be got, and the Ormskirk supply was the better of the two. He did not deny the fact that if they had not dealt with Ormskirk there was a great deal in their petition. The commissioners proposed to sink a well in proximity to the Ormskirk well, and they might entertain a fair apprehension that their source of supply would be affected. All parties, therefore, felt that an agreement should be made between them, and happily that agreement had been accomplished. The terms of that agreement were that the commissioners should take possession of their works and supply them at the rate of 1¼d. per 1000 gallons up to a certain amount, and beyond that amount at the rate of 1½d. He believed those terms would be found beneficial to the town of Ormskirk as well as to themselves. In reference to the Southport Water Company, the commissioners were willing to come under an arrangement to purchase their undertaking, on terms to be settled by arbitration. The company had known this all along, and there had been some negotiations on the subject. The commissioners were willing to meet the company fairly, and to leave it to any independent authority to say what the thing was worth, and to give them that amount, in an annuity settled upon the rates, or in any other way. If they were properly compensated, as he had no reason to doubt they would be, their property, looking to the way in which Parliament from time to time dealt with companies, would be far safer, existing in that manner, than as a private company. The commissioners were responsible for the drainage of the town, and in a flat district like that, a large amount of water was necessary for flushing purposes. It was, therefore, clear that they were the parties who should have the control of the requisite water supply. Why should not the commissioners supply it? Simply because the Southport Company said, "We desire to go on supplying water, and to make 10 per cent. out of it." But if they were adequately compensated they could not complain of injury. What would be the result? Why, of course, the commissioners could borrow money at 4 or 5 per cent. So far as the interests of the town were concerned, instead of paying 10 per cent. on their water, they could supply it by borrowing money at 5 per cent. They did not desire to make a profit. It was not like a private speculative company, where they put the maximum dividend into their pocket, and in all time to come, whether they looked to efficiency, purity, or economy of supply, in every point of view it was more than advisable for the supply of water for the town of Southport to be in the hands of the commissioners, or the corporation, than in those of a private company.

Mr. RODWELL said he was at a loss to find in the speech of his learned friend any argument in support of exceptional legislation in the present case. His experience in these matters taught him that when a person proposed terms at the close of an address, it was from a great want of confidence in the strength of his own case, and with a hope of extricating himself from defeat. In this particular case surely the proposal now made was quite inconsistent with his friend's will. If he had come for compulsory powers in the first instance over their works, and if he then, before proceeding further, had come to offer terms, it would be but a fair and proper mode of proceeding, but the commissioners now asked Parliament to give them powers to introduce their works into the town of Southport, and said that if the company did not come to terms they would then compete. That was asking for compulsory powers in the most objectionable form. The court was asked to give them powers to compete in order that they might drive the company to an arrangement for the sale of their works. The inevitable consequence of the bill would be competition, and the commissioners wished the power to enable them to drive a hard bargain. On what ground was the bill introduced? The commissioners of Southport were almost *functi officio*. On the 1st of June their powers would cease, and it certainly was a very unfortunate moment for them to come forward with a bill involving a question affecting so deeply the interests of the ratepayers, and which might be disapproved of by the new constitution to be established on the 1st of June. It was suggested that a great many of those persons who were adverse to the commissioners having the powers, were so because they wanted to use their own filthy water, and to set the commissioners at defiance. It would have been far more satisfactory if those who seemed to have treated the inhabitants with the greatest contempt had called a public meeting, so that some expression of public opinion might be laid before the court as some guide as to the absolute necessity, because unless there was an absolute necessity for the bill he could hardly think they would pass a measure resulting in a sort of confiscation of the company's property. Who were the parties appearing to complain? From the address of his learned friend one would have supposed that complaint after complaint had been handed in; but it turned out that there were a few personal complaints, and that redress had been granted as soon as the complaints were made. Had there been any serious complaints made as to the quality and quantity of the water? He denied that those serious complaints had been made; they were of an ordinary character, and they had been remedied by the company. That was the case; and if there was no expression of public opinion in favour of their scheme—if there were no complaints of a serious character upon which they would act—what was the ground upon which his friend asked the court to give him powers to the prejudice of the company? There were some points in the case which it was needless to dwell upon. The company were prepared to give a perfectly good supply of water and there was no question of comparison between the respective water supplies. If that was the case, why should they be deprived of the power? Why should those who hitherto had conducted the business of a water company be penalized by the introduction of a rival scheme, by giving to the commissioners power to compel the parties to take their water, giving them extraordinary powers of competition, which must seriously affect his clients without yielding any adequate advantage to the inhabitants of Southport. If the authorities at Southport had felt that the inhabitants were not sufficiently supplied, if they found the poorer classes, or, indeed, any classes, had not the quantity of water which they ought to have, or the quality of water which was desirable, they had nothing to do but to put the public Acts in motion, and they could compel the company to supply, or if they could not, to come to Parliament and ask for powers themselves. What was the fact with regard to the cholera period? They had the evidence of Mr. Craven, who was called yesterday, and it appeared that during the period of the cholera they actually did take the pump-handles off the pumps, and the water was supplied by the company. At any rate, the commissioners ought to have given the company an opportunity of refusing to do that which he maintained they were bound to have done, and which, if they had refused to do, would have given them a *locus standi*. That was not material for the present inquiry because they were legislating for the future, and the question was not what had taken place, but was there for the future a necessity for passing that bill in order to secure proper water for the purpose of drainage, sewage, and the inhabitants of Southport being properly supplied with water. Upon that no question could arise. The Acts of Parliament passed were as clear as possible, and directly the new board was constituted they might go to the water-works company and apply to them for a supply of water; and, furthermore, they could compel the inhabitants who were not taking the proper water to use the water from the company's works. With regard to the present supply of water, there were many purposes for which it might be used, such as flushing the drains.

Mr. HASSARD: Are you going to lay down a separate main for that, Mr. Rodwell?

Mr. RODWELL said the company took power in their bill to lay down an additional main by the side of the existing main, and if there was any necessity for it, such a course would be perfectly possible; but if their engineers and geologists were right, there would be no necessity for using the hard water at all, as there would be an abundant supply of pure water. It would be a serious injury to the people of Southport if the court did not pass the company's bill, and did not give them the opportunity of giving a better supply? He could not gather from his friend's speech or evidence any

proof that any one individual would gain if the bill of the commissioners was passed and the company's rejected. He believed that all the interest that a public board might have in securing the health and comfort of the town whose interests were confided to them would be satisfied if the bill he advocated was passed; whereas, if the bill of the commissioners was granted, it would be exceptional legislation without any adequate reason for such a course. There had been no default proved on the part of the company, nor any sufficient ground shown for interfering with them in the discharge of a business which had, no doubt, been carried on by them at a profit. He trusted, therefore, that the decision of the referees would be in favour of the company, and that they would pass their bill so as to allow them to improve their works in the way proposed, and thus place themselves in a position to supply the public of Southport with an ample and abundant supply of excessively clear water.

The referees retired, and on their return, in a few minutes, the chairman announced that they were of opinion that the preamble of the Southport Water Bill was proved, and that the preamble of the Southport Improvement (Water) Bill was not proved.

The clauses of the Water Company's Bill were then read and agreed to.

Court of Referees.

(*Present*:—*Mr.* Basil Thomas Woodd, *Chairman*; *Mr.* Scourfield, *and Sir* John Duckworth, *Bart.*)

CAMBRIDGE GAS BILL.

Thursday, March 14.

Mr. Forsyth, Q.C., Mr. Venables, Q.C., and Mr. J. G. Witt, appeared for the promoters; Mr. Webster, Q.C., and Mr. Cockerell, for the mayor, alderman, and burgesses of Cambridge, and the Cambridge Improvement Commissioners, petitioners against the bill. Petitions had also been presented by the London and North-Western Railway Company, and the chancellor, masters, and scholars of the University of Cambridge, against the bill, but no person appeared in support of them.

Formal evidence was given by Mr. *Charles Turner*, clerk to Mr. Peed, solicitor to the bill, that notice of application to Parliament had been served upon the bursar of St. John's College, and Mr. Charles Wisley, the owner and occupier of a portion of the property included in the deposited plans.

Mr. Venables said he did not know whether in this case it was necessary to make an application to the referees to hear more than one counsel on behalf of the promoters of the bill.

The Chairman said the referees had discussed this point, and they considered it was only right that the course usually adopted by committees should be pursued, and therefore parties appearing before the referees would be allowed to follow such course with respect to counsel as they thought proper.

Mr. Venables said it devolved upon him, in the absence of his learned friend, Mr. Forsyth, to open the case for the promoters of the bill, and he might say, in the first instance, that the question was one entirely of clauses, that the preamble was not opposed by the only petitioners who were before the referees. There was a general petition of the Cambridge Corporation and the Cambridge Improvement Commissioners, upon which an appearance had been entered. Other petitions had been presented, but the points out of which they arose having been settled, the first-named petition was the only one upon which any discussion would now take place. Of course, Mr. Webster would not be precluded by anything he said from going into the question of preamble, but looking over the petition upon which his learned friend appeared, he thought there was nothing in the preamble to which the allegations in the petition referred. There was originally a paragraph in the preamble relating to an extension of the limits of supply, but that had been struck out of the amended bill, and consequently the allegations in the petition upon that point were no longer of any force. There was no allegation in the petition objecting to the proposed new capital; no objection raised to the recital of the existing capital of the company. He thought, therefore, he was justified in stating that the opposition was entirely a matter of clauses, and he proposed at once, if the referees would allow him, to go through those clauses one by one, until he came to those which Mr. Webster objected to.

The Chairman: Mr. Webster, do you concur in the proposition that the preamble should be taken as proved?

Mr. Webster: I think my learned friend had better open his case in the usual form.

Mr. Venables said this was a bill for the purpose of changing the name of the Cambridge Gaslight Company (he did not know the motive for this change, but no one objected), to confer further powers on the company, and for other purposes. It was proposed by the bill to authorize the company to raise an additional capital of £50,000, with certain borrowing powers. He was not aware whether the provisions for this purpose were objected to.

Mr. Webster said there would be a question raised upon it.

Mr. Venables apprehended that any discussion in reference to it would be raised when the clauses came to be considered. The company at present was constituted under a system which might be said to have become obsolete, having obtained their Act of Incorporation in 1834, which was long before the Gas Clauses Act was passed, and the modern system of legislation introduced. Before that time the only gas supply in Cambridge was on a very scanty scale, and in the hands of a private person, who was joined by others in 1834, and formed the present company. They then had power to raise a capital of £37,500, of which all but about £2240 had been called up. They had ever since supplied the town, and from time to time had reduced the price of gas to the inhabitants, although throughout the whole of their Act there was no limitation or restriction upon them as to the price they should charge. Indeed, the company might, had they chosen to do so, irrespective of other considerations, have charged 20s. per 1000 cubic feet down to the present moment. The only kind of limitation upon them was that they were not allowed to divide among their shareholders more than 10 per cent. There were provisions in their Act, enabling them to make up deficiencies on back dividends, if any should arise, up to the prescribed rate, and then it was enacted that surplus profits, if any, should, instead of being applied in reduction of the price of gas, be paid to the Cambridge Improvement Commissioners. It did not appear upon what ground this was done, but he (Mr. Venables) supposed it was because they were entrusted with the watching of the borough that this provision was introduced. It had been, and was likely to remain without some fresh legislation, entirely inoperative, because the company had the power to reduce the price, instead of paying over the surplus profits to the commissioners, who, as it appeared, never had received any and were never likely to receive any under the present system. The object of the company by the bill now before the referees was to place themselves under the modern system of legislation; and it was proposed to incorporate in this bill the General Gas Clauses Act, the effect of which would be that in future the surplus profits, instead of being paid over to the Improvement Commissioners, would be applied in the reduction of the price of gas. There was an allegation in the petition presented against the bill by the Improvement Commissioners, that the section in the existing Act, which provided for the payment of surplus profits to them, constituted a parliamentary contract, and that the company, therefore, ought not to ask to be released from that contract without offering some equivalent. All he could say was, that if that were the opinion of the referees, the promoters would not strenuously oppose the re-enactment of that section as it stood. But he hardly thought the Cambridge Town Council would concur with the commissioners in this matter, and desire the surplus profits to be paid over for the benefit of ratepayers who might not be identical with the gas consumers of the borough. There were several points in the bill upon which the company and the petitioners had been in communication, and had come to an agreement which was carried out by clauses in the filled-up bill, and on these points, therefore, it would not be necessary to trouble the referees. There was, however, one allegation in the petition to which he thought he should have to refer, which was, that the gas supplied by the company was bad in quality and excessive in price. Now whether his learned friend intended to press that point or not, he really did not know; but, for his own part, he must say he considered it a point of secondary importance, for whatever might have been the quality of the gas hitherto, it would be provided for in the future by the usual clauses, which had been introduced in the present bill. They, however, had good grounds for contending that the gas supplied had in fact been of good quality; and on this head he might remark that years ago the commissioners themselves contracted for a supply of gas, and on the proposed renewal of the contract, in 1865, they appointed a committee, which reported unfavourably to the company. But although, of course, he could not admit the accuracy of anything said in that report, which might be unfavourable to the company, he accepted any admissions which were favourable to them.

The Chairman: That is a contract to supply the corporation at a certain price.

Mr. Venables said there was an existing contract which would come to an end next year, but this committee was appointed beforehand to consider the matter. In the second paragraph of their report the committee said: "In the gas Act is a clause by which it was supposed the company were limited to a 10 per cent. dividend, the surplus to be applied for the benefit of the town; but by the opinion of counsel, recently taken, this opinion seems to be a mistake, and practically the company possess a monopoly without any limitation of profit. We have applied to various towns for the prices paid for gas by the public and private consumers. The answers are in the hands of the clerk, but from the different circumstances of time during which the lamps are lighted, price of coals, &c., not much practical information is afforded." Now he ventured to suggest that there was some very practical information from that recital. They had got returns from many towns, but with one exception, which they afterwards alleged, they thought it better not to produce those returns. The result of the whole was a virtual admission on their part that, compared with other towns, the price of gas at Cambridge was perfectly reasonable. They did, however, refer to one case, that of the Birmingham and Staffordshire Gas Company, which they stated was an instance of a cheaper supply. Now he would venture to say that the circumstances of Birmingham and Cambridge were as unlike as any two towns in the kingdom in reference to the supply of gas. Birmingham was situated in the heart of the coal district, and the committee, indeed, stated that the consumption of Birmingham being much larger than that of Cambridge, consequently the company could supply its gas at a cheaper rate than could be done at Cambridge. Indeed it was obvious that the circumstances of Cambridge were altogether different from those of Birmingham. The real question was, what could a gas company afford to do at Cambridge? Then they say: "With respect to the quality of the gas, your committee, have obtained the opinion of Professor Liveing, which is appended hereto, and by which it appears that the gas supplied contains an inexcusable quantity of ammonia, which diminishes the lighting power, and renders the gas noxious in dwelling-houses; also a sensible quantity of carbonic acid gas, highly injurious to the brilliancy of the light, and which ammonia and carbonic acid gas might be and ought to be entirely removed. In a supplementary report, the professor adds that he does not think the gas contrasts unfavourably with that supplied by many other works, but whether consistently with the extracts quoted from his first report that can mean anything more than that the gas of some other company is as bad as ours we leave the commissioners to determine." It appeared, therefore, that the committee would not accept the testimony of their own professor, but declared that neither "the price, quantity, nor quality of the gas is sufficient." He (Mr. Venables) would ask the referees to look at the report of Professor Liveing itself, dated the 20th of February, and see what he said: "In the gas examined I find the proportion of heavy hydrocarbons, on which the brilliancy of the light is mainly dependent, about equal to that in samples of gas considered as good from other gas-works. The proportion of gases that are injurious to the light is, however, large enough to diminish considerably the brilliancy, though I am not prepared to say that it is such as to reduce the brilliancy below the average of gas from other works. I find, however, that a portion of this gas is such as can and ought to be removed by a proper system of purification. In particular, I was much surprised at the large proportion of ammonia present, which ought to be entirely removed, not only because it diminishes the lighting power of the gas, but gives rise to products when the gas is burned which are noxious in dwelling-houses. I consider the quantity of ammonia present is altogether inexcusable, as its presence is easily detected, and it is as easily removed. I find also a sensible quantity of carbonic acid gas, which also may be entirely removed, and is highly injurious to the brilliancy of the light. I am unable to give to-day any numerical results which I consider trustworthy, as the experiments necessary for this purpose are somewhat tedious, and not yet complete, but I hope to be able to do so in a few days." In a second report, Professor Liveing stated: "I have but little to add to my report already sent to you upon gas. I find, however, that the quantity of ammonia and carbonic acid, when reduced to figures, is less than I had supposed before my analysis was complete—the former only about ½ per cent., and the latter not more than 3 per cent. I find the proportion of nitrogen fully as large as I supposed when I wrote my report—viz., 10 per cent.; carbonic oxide rather more than 6 per cent. The rest of the gas consists of hydrogen and hydrocarbons, with respect to which I have only determined the relative proportion of carbon and hydrogen, on which the illuminating power of the gas depends, and find it as I have before stated, equal to that in samples of gas, considered as of very good quality, made elsewhere. I find no sulphuretted hydrogen, or only the faintest trace, so that in this respect the gas is very pure. With respect to the ammonia and carbonic acid, I am of opinion that the purification might with advantage be pushed further. The nitrogen,

which from its quantity must affect the light more than any of the before-mentioned gases in so small a quantity cannot be removed by any system of purification, though the proportion might be reduced by careful distillation. On the whole, I do not think the gas contrasts unfavourably with that supplied by many other works, so far as I can judge by the published analyses, though I have pointed out where it is inferior to the best samples." The result of the report was that the gas supplied by the Cambridge Company was, on the whole, of good quality, even according to the opinion of the adviser selected by the Improvement Commissioners. A retrospective inquiry into the quality of the gas was not, however, a matter of primary importance; but still, as it would probably be referred to by his learned friend on the other side, he had thought it his duty to direct the attention of the committee to the subject. But the material question on which the contest would principally turn, related to the 33rd section of the old Act. The Act which was passed in 1834 provided for what might happen after the year 1840; and the 33rd section was to the effect that from and after the 24th of June, 1840, the company of proprietors should not be entitled to receive out of the clear profits arising from the said undertaking more than the sum of £5 per annum on each share of £50, in estimating which clear profits no interest on the original capital of £30,000 advanced on the said undertaking should be deducted or allowed. In order to ascertain this, the company were bound, after the 24th of June, 1840, to make out a true, exact, and particular account annually of the money collected or received by them or for their use by virtue of the Act, and of the charges and expenses attendant on the supporting, maintaining, and using the works. Provision was also made for the audit of the account by the vice-chancellor, the mayor, and three of the commissioners, to be chosen for that purpose. This he might state incidentally had always been done; and it was then provided that, if the clear profits of the undertaking should at any time thereafter amount to more than sufficient to make the distribution of £5 per share per annum to every shareholder, then and in such case the excess or surplus profits should from time to time be placed in the hands of such person or persons, or upon such Government or other securities as might be appointed, to answer any deficiency in any succeeding years dividends, until such excess amounted to £3000; that the interest and dividends on the £3000 should be received and applied as other moneys were applied; and that, within 14 days after making up the annual accounts, a statement thereof should be laid before the vice-chancellor of the university, the mayor of the borough, and the Improvement Commissioners. It was then further enacted that, if it should appear that the clear profits of the undertaking should, on an average of three years next preceding, exceed 10 per cent., then, and in every such case, the company should pay the surplus to the said commmissioners for paving, lighting, and cleansing the town of Cambridge, to be by them applied for their own purposes. And there was added a penalty in case of the company refusing or wilfully neglecting to lay their accounts before the authorities. It was upon this section that the present inquiry would turn. The referees would see, therefore, that the company were entitled to £5 per £50 share per annum from the year 1840, if they could make it; and £3000 was to be invested for the purpose of making up any deficiencies which might arise in future years; clearly showing the intention of the Legislature to secure, as far as possible, the equalization of the dividends of the promoters. The words of the clause might, perhaps, at first sight strike the court as not very definite, but that there was no doubt on this point was evident from the opinion of counsel, quoted in the report of the committee which he had just read. The company had never claimed more, and did not claim more than that now. It was not, as loosely stated by the commissioners, that they possessed "a monopoly without any limitation of profit;" it was simply that they had a legal right to make up back dividends to the prescribed rate of 10 per cent. out of future earnings. If there were any dispute upon that point, it would of course be entirely a legal question. The present shareholders either had or had not a right to those arrears, and he (Mr. Venables) would tell the referees presently what the dividends actually paid had been, and what arrears were now due. There was a deficiency, and to that deficiency the present shareholders claimed to have a right. The Improvement Commissioners, on their own counsel's opinion, admitted that right. The shareholders had a vested interest in it, and all they asked now was that they might be remitted to their legal rights. The petitioners would not seek to alter the legal position of the shareholders, unless they were satisfied the company were right in their interpretation of the section; for otherwise they need not oppose them on this occasion, but adopt such legal measures as the Act of Parliament gave them. With reference to the price which the company had hitherto charged for gas, he might remark that that had been regulated entirely at the discretion of the company. It 1840, it was 10s. per 1000 feet; in 1842, it was 9s.; in 1846, 8s.; in 1848, 7s.; in 1849, 6s.; in 1851, 5s. 6d.; in 1854, 5s.; in 1860, 4s.; at which figure it had remained ever since. In 1840-1 the rate of dividend was 7 per cent., and continued to be so until the year 1847, when it was raised to 8 per cent. It 1848 and 1849 it was 9 per cent., in 1850 and 1851 it was 9 and 8 and 8 and 7 per cent., there being a difference in the two portions of two of those years. The rate of dividend returned to 7 per cent. from 1851 to 1858. In 1859 and 1860 it was 8 per cent., and since the last-named year it had been 10 per cent. But with regard to the year 1857, when the rate of dividend was only 7 per cent., the deficiency between 7 and 10 per cent. had been made up in subsequent years, and the same process had taken place in reference to the period when the dividend was 8 per cent., so that practically the shareholders had, since 1857 inclusive, received dividends of 10 per cent., deficiencies having been made up by retrospective payments. The amount required in order to pay up all the arrears from 1840, so that 10 per cent might be paid up from that year, was £13,667, allowance being made for the 10 per cent. which had been paid since 1857. He believed that one part of the opposition of the petitioners would be against the company applying the surplus profits of the future to make up that £13,667. It had happened, he might remark, that in some late years there had been a small balance short of the 10 per cent. The repairs had been very heavy, and the maintenance also, the reason being that in 1840 the whole system of gas was in a comparatively rude state, and the works were not as good as they might be made, and the surplus dividends consequently had to be applied in repairing and replacing works which had been worn out. He believed, however, that the revenue had been properly applied to maintenance and repairs, and substituting good works for works which were comparatively imperfect. Probably there had been some extension of mains, but not sufficient to justify the creation of new capital. Mr. Hawksley had gone down to Cambridge to examine the whole property, and he found that the structural value of the works was, at the present moment, not quite so much as the authorized capital of the company. The company, in fact, had only been able by what they had expended out of the revenue to keep up their works at their original value.

Sir JOHN DUCKWORTH: That is the £37,440, less the £2000 odd, which you have not raised?

Mr. VENABLES said it was. Practically it came within the capital and did not exceed it, therefore they came before Parliament saying that they had performed their duty to the public. The petitioners did not dispute that it was for the public interest that the company should raise an additional capital, and of course on that additional capital the company must be content with the rate of profit which Parliament customarily allowed to gas-works—*i.e.*, that the shareholders should be entitled not only to 10 per cent. earned in each year, but also, whenever the surplus profits allowed of it, to make good those sums which had been previously lost. There had been numerous communications between the petitioners and the company, in one of which it was said that it would be a desirable thing to abandon this claim, because most of the original shareholders had probably ceased to hold their shares. That, however, was an entirely new principle to introduce in the consideration of a question like this. It was absurd to say that because people might have left their property to their children, or sold their shares to purchasers, therefore the existing shareholders ought not to be considered for all purposes as standing in the place of the original shareholders. The company had received notice to produce, among other documents, a correspondence which had taken place between the company and the committee appointed by the Town Council and the Improvement Commissioners. He had that correspondence before him; but he would not, however, read any part of it to the committee, being content to leave it to his learned friend on the other side to point out anything in it which he might deem material. He might, however, mention that the committee of the Town Council and commissioners, after considering the subject, sent the company certain observations, in reply to which the company proposed that the matters in dispute should be referred to a competent arbitrator, who should settle the provisions of the bill. The committee, however, declined to adopt that plan, and, of course, the company could not complain of their having come to that decision. Subsequently, a communication was made to Mr. Beales, the mayor of Cambridge, and there was also some further correspondence, which resulted in an agreement being arrived at in regard to some points which had previously been in dispute. In the petition presented, there was an allegation that the company had not fulfilled the obligations imposed upon them by their Act, to deliver a statement of their accounts and pay over their surplus profits to the Improvement Commissioners, but had applied and expended the whole of those surplus profits in the extension and improvement of their works. Now it was provided in the Act, as he had already stated, that if the company failed to produce their books and accounts, they were liable to a penalty of £50 for such refusal or neglect, and a further fine of £5 a day so long as that refusal or neglect continued. But, as a matter of fact, they had not only presented their accounts annually, in a strictly correct form, to the proper person, but they had the signature of that person for every year, certifying those accounts as correct. Therefore how such an allegation came into the petition, he was at a loss to know. Whether it was meant as an argumentative assertion that the accounts were not drawn up in a proper form it was immaterial now to consider, because, if not, it was the duty of the auditors who represented the petitioners to refuse to certify those accounts. The company had taken particular care to be correct. They had, from time to time, acted under the advice of the most eminent counsel at the bar, as to the way in which those accounts should be drawn, and they were prepared to defend the course they had adopted. As to the complaint that the surplus profits had not been paid over to the commissioners, he might remark that the real reason was this: the company had applied those surplus profits to that which they were entitled to apply them—viz., a reduction in the price of gas; and why the commissioners as a public body representing the gas consumers of Cambridge, should complain of this, he was at a loss to understand. It was absolutely impossible for a gas company, from year to year, not to expend some surplus profits in a way which might be said to be applying them to capital purposes; but in this case they had not done it to a large extent, for though they had thus improved their works and made repairs where required, the allegation of the petitioners was substantially incorrect. The 12th paragraph in the petition objected to the repeal of the section of the existing Act, which he had already referred to, as unnecessary and inexpedient. He must wait on this point to hear what his learned friend (Mr. Webster) had to say, merely remarking that, if this should be the opinion of the referees, the company would bow to their decision, though they believed the proposal they made in their bill would be more beneficial to themselves and to the public. It was also alleged in the petition "that no payment should be made to the shareholders of the company after the passing of the said bill, for the purpose of making up dividends prior to the passing thereof"—that was to say, that the £13,600 of arrears of dividend now due to them should be withheld. Now the Gas-Works Clauses Act, which was incorporated in this bill, expressly recognized the principle of making up the maximum dividend prescribed by the special Acts of gas companies by retrospective payments; and all the company asked for was to be left in their present position, and he saw no reason, when they came to ask for additional capital, why vested interests, which had been dealt with in wills, trust-deeds, and other ways, should be dealt with in a manner which could diminish the property of the company. It was perfectly clear that this £13,667 was a sum of which an actuary could have estimated the value in the market, and to take it away would be simply to take so many £10 notes out of the pockets of the shareholders. No reason could, as he believed, be possibly shown for such a proceeding on this occasion. The bill provided for the future management of the company, and had nothing whatever to do with their actual vested rights. The petitioners further complained that the quality of the gas was defective, and the pressure insufficient; but upon these points he would call Mr. Hawksley, who would satisfy the referees that the company had done their duty to the public. The petitioners complained further that the price of 4s. was much too high, that the proposed maximum was exorbitant, and the mode of fixing it illusory and unworkable. This, of course, was a matter of vital importance to the company. They asked for this price, and would show that, in a county so far removed from the coal district, this was not an extravagant charge to make. There was a provision in the clause prescribing the price of gas, which provided for a certain increase as the price of coals rose. This was a matter which every gas company had to look to with every possible care, because at the present time the price of coals was rising, and was likely to rise. It so happened that the Cambridge Company had a contract with a company in the midland coal-field, under which they were now working; but, having made overtures for a renewal thereof, they had received an intimation from that company that, though they were willing to negotiate a fresh contract, it must not be expected they could do so at the same price as before. The gas company, therefore, proposed as a prudent arrangement that they should be allowed, as the price of coal increased and in proportion

to the rise, an additional price for their gas. The last section of the petition alleged that this bill should not pass into a law unless provision were made in it for obliging the company to sell their undertaking, works, and property to the corporation. He (Mr. Venables) believed there was not the slightest probability that they would even wish to do it, and he was not aware of any ground upon which the corporation could claim the right to a compulsory sale. It was not a usual provision to make in a bill of this kind, and he should wait to hear whether his learned friend pressed it upon the attention of the court. He believed he had now explained as much as it was needful to do at this stage of the proceedings. The only two points which would call for much inquiry were the questions of the price of gas and the payment of back dividends. The general policy of the bill he could hardly doubt the referees would approve. It was not disputed that the company wanted more capital, and he was sure the referees would feel it was better to bring the company under the provisions of modern legislation, instead of leaving them under the obsolete system which had hitherto regulated their proceedings.

Thomas Hawksley, Esq., examined by Mr. FORSYTH.

I have had great experience in gas-works. I have known the Cambridge Gas-Works for a good many years. I visited them last week with a view to this inquiry, and considered carefully their present condition and capabilities' as also their structural value. I should put their structural value at £36,000. That sum is subject, of course, to some further outlay, in order to put some parts of the works in good condition, and make them efficient for the purpose of supplying the town as it now stands. That further sum would be between £3000 and £4000. The value of the works is rather below the amount of capital raised, because one of the gasholders is out of order, and the mains leading from the works into the town are too small to carry the proper quantity of gas that is required for the wants of the public. There is a certain amount of deterioration existing in the works at the present moment which has not yet been provided for out of the funds of the company, and which is fairly chargeable upon revenue.

Mr. FORSYTH: In point of fact, then, you are of opinion that less of the profits have been appropriated for maintenance and repairs than is necessary?

Witness: Absolutely so, for the capability of the works as they stand is 480,000 cubic feet per day, and the mains will not pass that quantity of gas to the town unless they are enlarged. The largest quantity they can pass is 420,000 cubic feet a day, and the amount of friction is so great, that it takes off more than half the pressure before the gas reaches the town. They have also the most extraordinary thing I ever heard of in connexion with their system of distribution. One of the pipes leading from the works into town is of brickwork. I never heard of such a thing before; it is very unfit for the purpose, and ought to be substituted by a large iron pipe. I have examined the gas as to its quality. The gas, measured upon the premises of the company on Saturday last, was of an illuminating power of 16 candles. It would lose about 2 candles in its passage through the town. Compared with the quality of gas in other towns it is satisfactory. The company purchase very excellent coal, a coal I know very well, and which is being largely used in some of the works with which I am connected, and which gives gas of about the illuminating power I mention. It is Darley Main coal. The price of gas at Cambridge has been for some years, and is now, 4s. per 1000 cubic feet. I think that that is a moderate price under the circumstances. The supply in such a small town as Cambridge is under half a million cubic feet a day in the midst of winter. There are no collieries in the neighbourhood, consequently coal is very dear, and is increasing in price. On the average of many years past, coal has been increasing in price 3d. a ton per annum. That has been the general average increase for the last 10 or 12 years. I am speaking, of course, of gas coal.

Cross-examined by Mr. WEBSTER: The price of coal at Cambridge is about 14s. a ton. The population is about 30,000. The lower the price of gas, the more, of course, is the consumption stimulated, which is productive of an increased revenue, but not necessarily larger profits. The value of coke varies much in different places. At Cambridge the price is low, 9s. per chaldron. In London it is generally 10s. The other residual products are utilized at Cambridge. As much in my opinion has been made of the residual products as can reasonably be expected. The company manufacture their own ammoniacal liquor, and I saw their process, which appeared to be economical. I inquired the price at which they are now selling their salts, and I found that it was about the standard price which is paid in other parts of the kingdom. I found that a Mr. Major was their contractor for tar. I inquired the price which he gave, and learned that it was 9s. per 100 gallons, which is a very good price.

Mr. FORSYTH: Do I understand that my friend is raising these questions now for the purpose of contending that the price of gas is too high?

Mr. WEBSTER: Yes.

Mr. FORSYTH: Because by the bill now before the referees, after we get 10 per cent. the price must be reduced. Perhaps you will just point out to what part of the preamble this refers.

The CHAIRMAN said he thought Mr. Webster was entitled to go on with that line of cross-examination, as he would probably contend that if the company had employed their profits to a better purpose they would have been enabled to reduce their price.

Mr. FORSYTH said the bill incorporated the General Act, and by that Act, after the company divided 10 per cent., the profits must go in reduction of the price of gas. He thought this was all his learned friend could possibly want, unless he was prepared to contend that the company ought not to have 10 per cent.

Sir JOHN DUCKWORTH said if the surplus was to be paid over to the commissioners instead of going in diminution of the price of gas, there would be a question arising—but they would hear presently what Mr. Webster meant.

Cross-examination continued: I went to Cambridge to examine these works last week. That was not the first time I had been there. I once had occasion to value them, and to ascertain their capabilities for another purpose, and I then made a minute examination and valuation.

Mr. WEBSTER: You say that you found the gas at the works on the day when you were testing for illuminating power was 16 candles.

Witness: It was.

Mr. WEBSTER: And you estimated that there was a loss of 2 candles in its passage into the town?

Witness: I know that practically it does so at Nottingham. It loses about 2 candles in passing to the centre of the town.

Mr. WEBSTER: It does not deteriorate in illuminating power according to distance, but after a certain distance it has lost all it will lose?

Witness: Very nearly.

Mr. WEBSTER: Within about what distance is that loss effected with this coal?

Witness: In about half a mile the principal part of the condensable vapours become condensed, especially in winter. The distance varies according to the temperature of the ground, but in cold weather the greater part of the condensable vapours, which form a portion of the illuminating power of the gas when first made, becomes condensed, and the liquid runs into the syphons. After that there is a very much smaller quantity left capable of being condensed. Gas consists of a permanent elastic gas, which holds in solution three or four condensable vapours, condensed at different temperatures, and as the gas passes through the pipes it loses by condensation a part of these vapours, the whole of which possess some illuminating properties.

Mr. WEBSTER: Are all these condensable vapours hydrocarbons?

Witness: Yes.

Mr. WEBSTER: Then why do some condense at one temperature, and some at another?

Witness: Because they are of different densities and different compositions. One distils over at a low heat; as the heat gets higher in the retort another kind of condensable vapour comes off, and as it gets higher there is another, and so on; and just as they are produced at higher temperatures so, in turn, they become less condensable, and will travel to a greater distance. A great many of them are condensed at the works, by passing through the hydraulic main of the condenser, and a few also in the gasholder, while others are condensed in the main. I do not mean the whole of them, because at last there are some condensable gases at the burner.

Mr. WEBSTER: May I take it as a general rule that about 1000 yards is a sufficient distance at which to test the gas? Will it have lost these hydrocarbons at that distance?

Witness: It will have lost a large portion of these hydrocarbons in the first 1000 yards in winter. I do not mean to say it will do the same in the summer. In summer it would lose about 1½ candle, or a little less, while in winter it would lose about 2 candles.

Mr. WEBSTER: One thousand yards is no uncommon distance to fix for testing it at, is it?

Witness: It is a very uncommon distance; so much so that I do not recollect any case in which 1000 yards is stated, except in the case of the metropolis.

Mr. WEBSTER: I thought you and I had met before on that point; perhaps we may meet again.

Witness: I suppose we shall.

Mr. WEBSTER: Then 1000 yards is taken in the metropolis as a fair standard, beyond which the gas would not lose much in illuminating power?

Witness: There would be some loss, but not much.

Mr. WEBSTER: Then, with regard to the difference of temperature between winter and summer, you put it in this way—that it would make a difference in the illuminating power of 2 candles in the one case and 1½ candle in the other?

Witness: Yes. Of course different coals will yield different hydrocarbon vapours, so that no positive rule can be given, but that is a fair statement.

Mr. WEBSTER: We are dealing with the Darley Main coal, and we may take it that, manufacturing gas with ordinary skill, there is a loss of 2 candles in the winter and 1½ candle in the summer?

Witness: Yes; but then I do not suppose the gas company will be always in a position to make a contract with the Darley Main Company. They must have an open field, or the price would very soon become enormous.

Mr. WEBSTER: Has the price of coal so much to do with it?

Witness: That depends entirely upon circumstances. In some cases the residual products give a very large return; in other cases they are very small. The Cambridge case is a medium case. I tested the gas for ammonia, and there was no sensible quantity of it in the gas. I tested it also for sulphuretted hydrogen, and found it quite free from it. As for carbonic acid, there could not be any in it, because they happen to have a lime-vessel through which the gas passes. How the money has been expended I do not say, because this company has existed 30 or 40 years; but what I say very distinctly is, that the present structural value is not more than £34,000, and, therefore, whatever has been laid out upon them, it is necessary that more should be expended in order to get them into proper order and condition. The revenue made up to June, 1866, is £13,935. The present structural value is, therefore, equal to 2½ years revenue. The amount obtained for coke is £1907; for lime, £88; salt, &c., £198; tar, £427. The company also do a fitting trade; the sum received for gas-fittings was £1851. The total receipts of the company for all purposes connected with the manufacture of gas was £18,428. There are two cottages, the rent of which is £15 a year. They receive from other sources £323. The gross quantity of gas manufactured last year was 66 million cubic feet. That would represent between 7200 and 7500 tons of coal, conducted on the principle it has been. I don't know the amount of coal actually used, but I believe I am right.

Mr. WEBSTER: Did you inquire what was applied last year out of revenue to capital purposes?

Witness: Yes; I do not say towards capital, but I inquired what had been applied out of revenue?

Mr. WEBSTER: Did you inquire what was last year applied to maintenance of works, for instance?

The CHAIRMAN: You should draw a distinction, Mr. Webster, between maintenance of works and new works, because maintenance of works is only keeping the works up in the ordinary state.

Witness: I do not know that there were any new works proper. There has been a gasholder telescoped, but that is only enough for present purposes.

Mr. WEBSTER: Then may I take it, according to your evidence, that during the last year the revenue was applied not to what we call new works or capital proper, but to maintenance of existing works?

Witness: To the improvement of existing works for the present manufacture. For instance, changed their ovens to retorts.

Mr. WEBSTER: That, I suppose, would not be improperly treated as maintenance?

Witness: No; that is what commonly goes on in all gas-works constantly. I would not say that there has been no small extension of mains, because that is necessarily going on. A good deal, of course, depends on the way the accounts are kept, as to the means of getting correct information. In some recent Acts of Parliament it is found expedient to attach a schedule to the Act pointing out the way in which the accounts should be kept. Two of those Acts relate to the provinces—Birmingham and Brighton—and one is the General Act relating to the metropolis. There are infinitely more cases in which it has not been adopted.

Sir JOHN DUCKWORTH: The Metropolis Gas Act of 1860 was a general Act applicable to all companies, and not to any particular one.

Witness: It was by a general Act, and then there was a form differing

slightly for each company. The Secretary of State has power to prescribe the form.

Mr. WEBSTER: I take it that a schedule of this kind would much facilitate the process of keeping the accounts, and show when the price ought to be altered.

Witness: To a stranger to the company.

Mr. WEBSTER: Well, but there is a great deal of magic in making up an account.

Witness: No, not where, as in the case of this company, they believe they have invested much more money than the works are worth.

Mr. WEBSTER: But accounts may be so made up as not to be very intelligible to the uninitiated?

Witness: Accounts may be made up in very many ways, and that form of account will not prevent it.

Mr. WEBSTER: Then do you think the companies will be too much for Parliament?

Witness: No, I do not. I think you are insinuating rather unfavourably to companies, because I do not believe they misconduct themselves in the way your questions suggest.

Mr. WEBSTER: You say you have had your attention called to the state of the company for many years past. Are you aware that considerable dissatisfaction exists as to the form in which their accounts have been rendered?

Witness: I was not aware till lately, I am aware there is now. It is quite a common incident.

Mr. WEBSTER: Quite so. I will not say that the companies are too much for Parliament, but there has been, and I suppose will be, contests between them and the public.

Witness: Likely enough. The companies think the public want to know too much, and that is not unfrequently the case.

Mr. WEBSTER: You know that for several years past there has been dissatisfaction between certain parties at Cambridge and this company?

Witness: I do not know that it has been going on for some years, but I know it has been so lately. I infer it has from what you state.

Mr. WEBSTER: I have in my hands the account for 1866, and I observe an item of "tradesmen's bills." What are "tradesmen's bills"?

Witness: It includes everything expended on the works, with the exception of the stock upon the premises—new mains, new retorts, new gasholders, new purifiers, and everything of that kind, as well as tradesmen's accounts for the supply of other materials.

Mr. WEBSTER: Now listen to this [reading from report of auditors]: "We have made no attempt to distinguish how much of the expenditure may have been in respect of maintenance of works and working expenses, and how much in respect of improvements or extensions of the works. Doubtless a large sum has been expended in the latter, the wants of the town continually requiring large extensions."

Witness: That is an inference which is not justified by the fact.

Mr. WEBSTER: Having read that to you, I will ask whether, if that be a statement made by the company, it is not very reasonable there should be that dissatisfaction?

Witness: In the first place, that is a report made to the Improvement Commissioners by their own representatives—viz., the auditors.

Mr. WEBSTER: If that be the fact, and a statement of that kind was read at a general meeting of the proprietors——

Mr. FORSYTH: I think you will find that this was made by the auditors appointed by the mayor and vice-chancellor upon the accounts rendered to them, and not made by us.

Mr. WEBSTER: At all events such a statement would justify or lead to the complaints I have referred to.

Witness: Very likely.

Mr. WEBSTER: You told us that the friction took off more than half the pressure. Was that the precise quantity at Cambridge, or is that a circumstance due to ordinary causes?

Witness: No; the quantity at Cambridge. At the gas offices in the centre of the town, opposite Sydney College, the pressure on Saturday night was only about 9/10ths of an inch, when the pressure at the works was about 4 inches. But the main to which I referred—the brick main and supplemental pipe—extends about half the distance between the two places, and no doubt the diminution from that cause was about half the difference between 9/10ths of an inch and 4 inches.

Mr. WEBSTER: Then I think you will agree with the statement of the petitioners that the pressure is insufficient.

Witness: No; 9/10ths of an inch is sufficient to give a light, but the mains are too small to pass the amount of gas the works will make. At the remotest extremity of the town I have no doubt the pressure was too small, but we did not examine it. The distance of the works from the gas-offices is about three-quarters or it may be one mile.

Re-examined by Mr. FORSYTH: We incorporate in this bill the General Act of 1847. By the 35th section of that Act the profits of the company, when they are more than enough to pay the rate prescribed in the special Act of the company, are applied in a rateable reduction in the price of gas to the consumers. In order to ascertain this the General Act prescribes certain machinery. By sec. 38 it is enacted that the annual accounts are to be made up by the undertakers, and sent to the clerk of the peace of the county in England and Ireland, and to the sheriff clerk in Scotland, and shall be open to inspection. There are further sections giving, in certain cases, a right to the ratepayers to examine the accounts, and to the recorder compulsory power to enforce a reduction, and to prescribe what that reduction shall be. By another clause the company are subjected to a penalty of £100 for refusal or neglect to produce accounts, and the Act may be set in motion by any two ratepayers. I cannot see any reason why Cambridge should be taken out of the operation of the General Act. I think that Act effectually protects the public, so as to secure for them a proper reduction of price. I know that it has done so in a great many places. The accounts of the Cambridge Company have been certified by the auditors appointed for the purpose, and if they had been dissatisfied they might have required the production of all the company's books and papers. The 38rd section of the company's existing Act provides that the accounts are to be laid before the vice-chancellor, the mayor, and three of the commissioners, "and for the authentication of which accounts the company shall, if required, produce all their books, bills, receipts, vouchers, papers, and writings to the said vice-chancellor, mayor, and commissioners." Looking at the state of the works, probably the company have expended on them out of revenue less than they ought to have done.

Mr. FORSYTH: In order to test the fair average illuminating power of gas in a town, at what distance from the works ought the test to be applied?

Witness: That would depend on the obligations imposed on the company, with reference to the number of candles to which the illuminating power of the gas is to be equal, as supplied from any obtainable coal. In one place it would be one thing and in another place it would be another.

Mr. FORSYTH: Well, take the case of Cambridge.

Witness: At Cambridge, supposing the test were applied in the centre of the town, the obligation ought not to be to supply a quality exceeding 12 or 13 candles; but if the test is to be taken at the works, the obligation ought to be that the illuminating power should be equal to 14 candles. But the obligation as to 14 candles at the works would not imply that that should be the obligation with reference to illuminating power of the gas in the town, because every company must have a margin of 1 or 1½ over what is absolutely required by the law. I have known gas to go down 2 candles before leaving the works. If the obligation were 14 candles out of the works, the gas should leave the works at 15 candles, and the minimum in the town would be about 13½ candles.

Sir J. DUCKWORTH: If a minimum of 13½ were [required in] the town, it should be 15 at the works to make it safe?

Witness: Yes.

Sir J. DUCKWORTH: Is the testing apparatus usually erected at the works or at a certain distance from the works?

Witness: Mostly at the works, but in some cases at a distance from the works.

Mr. WEBSTER: There was a great contest in obtaining the Metropolitan Act as to where the testing should take place, and in the bill brought in last year by the Government, and in some other Acts, it is provided that the gas is to be tested at a certain distance from the works.

Sir J. DUCKWORTH: Of course, if the testing is to be done at the works you must make an allowance before the gas comes to be used.

Witness: It does not signify where the testing takes place, if a proper allowance be made. Anything that is satisfactory to the complaining party ought to be done, if the complaining party is willing to make the proper allowance.

Sir J. DUCKWORTH: Is it usual in these private gas Acts to make any provision as to where the testing shall take place—whether it is to be done at the works, or at a certain distance from the works?

Witness: In several of the gas Acts, in fact I may say a good number—perhaps nearly a third—that have been passed within the last few years, it has been provided that the gas should be tested in the town, but, as a matter of course, it is in those cases necessary that an exorbitantly high illuminating power should not be inserted in the bill. If it be thought more satisfactory to have the gas tested in the town, all I can say is, that a due allowance ought to be made for the depreciation that will take place in the gas—a depreciation which is not the fault of the company.

Sir J. DUCKWORTH: Are we to understand that where it is stated in a bill that the illuminating power is to be equal to 12 or 14 candles, it is meant that it shall be of that quality in the town, and not at the works?

Witness: No. In the majority of cases it is distinctly provided that the testing of the gas shall take place at the works. My own opinion is that the testing of gas at the works does not give satisfaction, and I conceive that the gas ought to be tested off the works, whether the testing takes place in the immediate neighbourhood of the works or in the centre of the town.

Mr. FORSYTH: By clause 54 of the present bill we propose that the company shall, within 12 months, cause an experimental meter to be erected, for the purpose of testing the illuminating power of the gas, and seeing that it is kept up to the required standard.

Witness: That is so; and the only question is where that meter should be placed. In a good many Acts the locality in which the meter is to be placed is fixed.

Mr. FORSYTH: Would it be desirable to fix in the bill the particular locality in which the meter should be fixed?

Witness: I do not see any objection to it. If you are to test all the gas of the company, you may test it near the works by having some premises for that purpose about 200 yards distance, or quite near the works, but not within them. It is not satisfactory to any one—it would not be to myself—to test the quality of the gas within the walls of the works, because in that case you cannot discover from what pipe the gas is at the moment being taken. Care must be taken with reference to the number of candles. With reference to the chemical constituents of the Cambridge gas, I am of opinion that, on the whole, its quality is good, and its price moderate.

F. G. Gifford, Esq., examined by Mr. VENABLES.

I have been for many years manager of the Cambridge Gas-Works. The price we are now paying for coal is 14s. per ton. We have it from the Darley Main, under a contract which is made from year to year. The present contract began last June, and will expire in June of the present year. It is made with the Midland and Yorkshire Coal Company. I have communicated with the company on the subject of the renewal of the contract, and they have replied that they are willing to tender for the ensuing year, but that the coal will be dearer than at present. I have found that for years the price of coals has risen steadily. The price is rising rapidly now, and the cost of labour in carrying on our works is very seriously increasing, and is much higher than it was when I first came to the works. We get the best price we can for the residual products, and take care to manufacture them with as little waste as possible.

Cross-examined by Mr. WEBSTER: We used a little over 7000 tons of coal last year. I have been connected with the company for 25 years. I am aware that complaints have been made to the company as to the accounts rendered to the auditors. The portion of the Act of Parliament which provides that the surplus should go to the Improvement Commissioners has been the subject of great contention, but the auditors have always had access to the bills and documents of the company in their audit of the accounts. It is impossible to keep the accounts more accurately than they are kept at present. It is possible that, in 1861, there may have been a complaint from the auditors as to their inability to audit the accounts properly, owing to the way in which they were kept, but I cannot fix the date. A complaint may have been made that the auditors were not permitted to take extracts of the accounts.

Mr. WEBSTER: Do you not know that the following resolution was passed by the company relative to another resolution passed on the 26th of January, 1859:—"Resolved, that the resolution passed at the general meeting held on the 26th of January, 1859, so far as it prohibits the taking of a copy of extracts from the balance-sheet, be rescinded"?

Witness: I know nothing of that resolution. I am only the manager of the works, and superintend the manufacture of the gas; and I do not know everything that takes place at the general meetings of the company.

Mr. WEBSTER: Do you not remember that, in 1861, an attempted inquiry, with a view to analyze some of the items of the year's expenditure, was stopped by the clerk, who instructed the superintendent to decline to answer any question on the subject?

Witness: I do recollect something of that sort. The clerk was Mr. Ad-

cock. He was solicitor to the company. The Improvement Commissioners have never received any surplus under the 33rd section of the Act, because we have had none to give them. The company has given the greatest satisfaction to the town, and I do not think we have a single complaint on our books at the present moment. There may have been complaints about the illuminating power of the gas, but they have been unfounded. I do not know that there have been any complaints as to pressure. I believe the pressure has been exceedingly good. The quality of the gas is tested every day by the company, but I am not aware of our having had any independent testing of the gas. It is not my experience that large sums have been expended from revenue for the purpose of extending the works. There have been very few new mains, but old mains have been taken up and replaced by larger ones. The money expended from revenue has been for maintenance. The lime is sold for manure. We have had complaints of nuisances said to have arisen from the works, but they were unfounded. The nuisances complained of arose, in my opinion, from a soap manufactory and a bone manufactory near the works. I do not reside at the works; I live in Sydney Street. There may have been a renewal of an old gasholder in 1850; but no new one was erected. The cost of the renewal may have been £1400. The cost of the renewal came out of revenue. We bought two cottages in 1853; we did not build them. I am not aware of an expenditure of £2000 for a gasholder. We manufacture the residual products into sulphate of ammonia, which is sold, but I do not know for what it is used. There were complaints from the commissioners of some smell, but I do not think it was attributable to our works.

The CHAIRMAN: Are there any complaints now that the manufacture of gas has been a nuisance?

Mr. WEBSTER: You are anticipating a very important question. The way in which the residual products were manufactured is not the subject of a penalty under the gas Acts; that is left to the remedy at common law.

Sir JOHN DUCKWORTH: There are all sorts of Acts that come into play.

Mr. WEBSTER: You will find that the only protection afforded by the gas Acts is against the fouling of water and the escape of gas.

Mr. FORSYTH: The provision is in respect of the "fouling of water, or other nuisance from gas." Nothing could be wider than that. It is also provided that nothing in the Act shall prevent the undertakers from being indicted for a nuisance occasioned in the manufacture of gas.

Cross-examination continued: The company are gas-fitters as well as gas manufacturers. The profits arising from gas-fitting have been brought into the company's accounts. I think they were first brought in about eight or nine years ago. The profits on lime are also brought in.

Re-examined by Mr. FORSYTH: The Town Improvement Commissioners sent a deputation to examine the works, but they arrived at no result. I believe they found that there was no complaint to make. I have never had any written complaint from them. There have been vague rumours, but no formal complaints. The Improvement Commissioners were responsible for the prevention of nuisances in the town. There is a soap manufactory about 300 yards from the works. There is also a bone manufactory near the works. I have not had any complaints as to the quality of the gas we supply, and none as to the price. The cottages purchased in 1853 cost £100 each.

By the CHAIRMAN: They adjoin the works.

By Mr. FORSYTH: They are occupied by labourers employed at the works. I cannot say whether any fresh capital was called up at this time. One of the labourers pays rent for his cottage, the other does not. We were never applied to under the terms of the 33rd section of the Act, and refused to supply any "accounts, bills, receipts, or vouchers, by the vice-chancellor, mayor, or commissioners, or any three of them." On unauthorized applications we have refused to supply accounts. The revenue has been applied to the renewal of works, and not to fresh extensions.

Charles Balls, Esq., examined by Mr. FORSYTH.

I am a magistrate of Cambridge, and a deputy-lieutenant of the county. I have been a director of the gas company for many years, and a shareholder for a still longer time. I purchased some of my shares in 1841. I have always understood that those shares were entitled to 10 per cent., paid up from the commencement. I bought the shares on the understanding that, although the dividend of a particular year did not amount to 10 per cent., if the profits of subsequent years came to more the holders of the shares were entitled to be recouped to the extent of the deficiency. That understanding influenced the price of shares in the market, and the shares have been made the subject of sales, settlements, and bequests; and, in fact, have been dealt with precisely in the same way as other descriptions of property.

Cross-examined by Mr. COCKERELL: I do not know what is the present market price of the shares. At the last sale I recollect one original share and one other share made from £93 to £95. That would be rather more than 5 per cent. on the purchase-money. A gentleman who purchased some shares last November told me that he fully expected to participate in all the advantages they conferred. The price of gas has been reduced several times by the company. It was not reduced some years ago from a fear of a new company being established. We reduced the price of gas in consequence of our position being such that we were enabled to do so from time to time, but we never did it in apprehension of a new company. I have never been present at the audits.

Re-examined by Mr. FORSYTH: No complaint was made of our refusal to supply accounts to those who were entitled under the Act to see them. There has never been any complaint that we have not complied with the terms of the Act of Parliament. The company have been enabled to reduce the price of gas because they have obtained an increased number of consumers, and greater economy has been effected in the manufacture. We have reduced the price from 10s. to 4s., and in the same ratio we have reduced the price of coke.

Mr. FORSYTH: That is the case on behalf of the company.

Mr. WEBSTER: From the course the case has taken, it is clear that there are two substantial questions for the court to consider. The first and main question as to the right to the payment of £13,677, the amount of the deficiency on the back dividends; the next question being as to the price of the gas. There are other questions as to the testing of the illuminating power, and the amount of capital the company has a right to have. The vital points are, however, as to what ought to be done with reference to the 33rd section, and the conduct of the company in respect to the requirements of that section, and also whether the company shall be allowed to make up the deficiency of £13,677 from future profits. My learned friend, Mr. Venables, in opening this case, said that if it was proposed to re-enact this clause relating to the surplus, the company would very strenuously resist it. But we do not ask you to re-enact it. No doubt it was originally enacted with the view of checking the dealings of the company, and the same enactment was made in the Oxford and other Acts of Parliament. This has not, however, been found a very convenient mode, and has not answered in practice, because, as you have already ascertained, no surplus has ever come into the hands of the Commissioners, and it must be clear to your minds that the reductions in the price of gas were made rather from the apprehension of a competing company, than from any pressure being put upon the company under this clause. The witnesses have said that the company have done everything that was possible to be done. I put some questions as to what had taken place in 1860 and 1861, and ascertained that there had been a continual contest between the company and the commissioners as to the accounts, the latter desiring very different accounts from those they had been in the habit of receiving. The report of the auditors of the 1st of February, 1861, says: "We, the undersigned auditors, acting under the powers of the 33rd section of the Cambridge Gas Act, having met at the gas office, and having inspected the accounts produced before us by the committee of management of the gas company, beg to report as follows:—By the certificate of the superintendent of the company hereto annexed, the total amount of the annual account of the company for the year ending 24th June last, is certified to be, total receipt, £14,542 19s. 11d.; total expenditure, £10,254 12s. 10d.; showing a net profit of £4288 7s. 1d." Now I have never made any imputation that the accounts were not fairly kept; but I say that the company have managed matters so that they have evaded the spirit of the clause, and are now taking advantage of their own wrong and endeavouring to make up the deficiency of £13,677, whereas, if the matter had been properly managed, there would never have been any deficiency at all.

Sir J. DUCKWORTH: Is there any clause in the present bill providing specifically for the payment of back dividends?

Mr. FORSYTH: There is a manuscript clause in the amended bill providing that the rights of the shares are to remain the same as at present—that whatever legal rights the shares have now they shall retain if the bill passes.

Mr. WEBSTER: The proposition is, that every share shall confer the same rights of paying all deficiencies as it would have had if the present bill were not passed; so that it makes a positive enactment. But I say that the company have so managed their affairs as to give the go-by completely to the 33rd section of the Act, and if I satisfy you that the conduct of the company bears the construction I put upon it, I think you will hardly be inclined to give them the extraordinary privilege they ask of having the deficiency of £13,677 made up. The shares may have changed hands entirely, and the present holders may be a totally new set of people.

The CHAIRMAN: It does not occur to me that the fact of the shares having changed hands can possibly alter the rights of the shares. If I buy a share, I buy it with all its liabilities and all its rights.

Mr. WEBSTER: Yes; but the company are now asking for a new state of things, and it is for you to inquire into the policy of the 33rd section, and the conduct of the parties who have had to carry it out. If what my friend says puts the true construction upon the matter, it must follow that those who now hold the shares must be answerable for the malfeasance of those who first purchased them. The auditors go on to say in their report: "The effect of the company's mode of making out their balance-sheet is that it is impossible to audit satisfactorily the accounts of any one year without going into and comparing them with the accounts of other years, to ascertain whether the contingencies are correctly estimated and the bills are not charged twice, once as bills incurred, and once as bills paid. The company has this year for the first time included the gas-fittings and lime account, thereby increasing the amount of divisible profits for the year by the sum of £923 0s. 4d. The auditors would have been glad to have reported upon the effect of the exclusion of this item from former accounts, but have not had an opportunity of doing so. With reference to the report of the auditors of the 28th of October, 1859, suggesting that communications should be entered into with the company to ensure that for the future the capital account of the company should be kept distinct from the current expenditure, it does not appear that any step has been taken by the improvement board, nor has any alteration been made in the company's mode of keeping the accounts. An attempted inquiry with a view to analyze some of the items of the year's expenditure, was stopped by the clerk, who instructed the superintendent to decline to answer any questions upon the subject." I should add here that the clerk was the professional adviser of the board. The auditors go on to say: "The auditors still think it desirable that the suggestion of the auditors of 1859 should receive the attention of the board. Upon the auditors inquiring whether this board intended to invest the admitted excess on the present year towards the £3000 accumulation, directed by the 33rd section of the Gas Act, they were informed that the company did not consider they were bound to invest anything until there was an excess, not only upon the year, but upon all the years from the 24th June, 1840, mentioned in the said clause. If this be the true construction of the Act it is difficult to understand the principle upon which the gas company can justify their refusal to open any former account, especially as the important item of profits for gas-fittings and lime has been uniformly excluded from such former accounts." I think, therefore, you can hardly doubt that the gas company have evaded the spirit of the Act of Parliament, and that the auditors have been frustrated in getting an account, and prevented from ascertaining what was due to capital and to revenue, so that proper returns might be recorded, with a view to giving effect to the policy of the Legislature in endeavouring to reduce the dividends, or to reduce the price of gas when the dividends have reached a certain amount. This mode of effecting the object contemplated by the Legislature having proved a failure, the method now resorted to is that contained in the Gas Clauses Act, relative to the inspection and auditing of the accounts, and even this has not been found sufficient, so that in recent Acts it has been found necessary to require the accounts to be kept in a particular form. The question is, whether the shareholders in this company must not take the consequences of the acts of their predecessors. In the second page of the appendix to the auditors report it is stated, "That if the vice-chancellor of the University of Cambridge, the mayor, or the gentlemen appointed by the Improvement Commissioners require the production of the company's books, vouchers, &c., for the authentication of the total receipts and disbursements, they will be produced at the company's office at any time they may appoint after the receipt of such requisition." Then there is a letter addressed, in the year 1861, to the committee of management of the gas company:—"Gentlemen, we propose to report specially to the Board of Improvement Commissioners upon the audit, under section 33 of the Gas Companies Act, with a view to arrange some more satisfactory course of proceeding for the future than that which has hitherto prevailed. Before we report we should be glad of the inspection and comparison of the last account with the accounts of former years on the following points:—The accounts submitted by the gas company are not, as directed by the Act, 'accounts of money collected or received,' but are accounts of charges made for gas, &c., supplied by the company, parts of which at the time of

each account are outstanding, and to meet the possibility of bad debts the company takes in each year a sum for contingencies that is properly a suspense item to be afterwards corrected by the actual result; and if the sums charged exceed the ultimate loss the commissioners are entitled to credit for the difference, which should be brought forward in the next account. A large item is charged in each year under the head of tradesmen's bills. These are not classified, and it appeared, at our former meeting, that bills paid and bills incurred and not paid were mixed up without distinction. It is impossible satisfactorily to audit this part of the accounts without ascertaining by comparison with former accounts that the same bills are not charged twice over, once as bills incurred and once as bills paid. The gas-fittings account is this year included as part of the profits of the company's undertaking. As this item has been excluded from all former accounts, the auditors should have on opportunity of ascertaining and reporting on the effect of such exclusion." Then comes the reply of the chairman, who says that, with every desire to comply with all legal requirements, the committee of management of the gas company could not admit the propriety of the request made to them; and he adds that as the gas company had already afforded the gentlemen appointed by the Board of Improvement Commissioners in former years the opportunity of looking into the expenses and charges of the company, they were of opinion that the Improvement Commissioners had mistaken their functions, and that their application to compare the accounts of one year with those of former years was beyond the requirements of the Act. Now, this may be true; but when the company claim to make up £13,000 of deficiency on back dividends from the passing of the Act, in 1840, to the present time, it is for the court to say whether the accounts should not be taken and compared year by year, in order that the profits of each year may be actually ascertained.

The CHAIRMAN: Do you contend that they have received more than they state?

Mr. WEBSTER: I have not the least doubt of it, if it could be ascertained.

The CHAIRMAN: That is a serious charge, and if you can prove that it will alter the thing entirely.

Mr. WEBSTER: We are not in a position to prove it, because they have prevented us from doing so.

The CHAIRMAN: Had the accounts been properly audited every year there would not be the least difficulty.

Mr. VENABLES: Exactly, and it is their own fault that they have not been properly audited.

The CHAIRMAN: There was no complaint made until 1859.

Mr. WEBSTER: There were continual complaints previous to that year, but in 1859 they assumed a specific form, and in 1861 the report and correspondence I have referred to appeared.

The CHAIRMAN: The Improvement Commissioners either neglected their duty altogether, or else they ought to have had amongst their papers copies of the reports and the accounts of each year to which they might have referred.

Mr. WEBSTER: "Neglected their duty." The five gentlemen, who are appointed a committee for this express purpose, say that the accounts of the gas company are not kept in accordance with the spirit of the Act of Parliament.

The CHAIRMAN: I am not speaking of these five gentlemen; but whoever they were, they must have had accounts presented at some time or other, which they must have audited and passed as correct, and of which they must have copies amongst their records.

Mr. WEBSTER: What do you mean by "audited and passed as correct"?

The CHAIRMAN: The question is, what they meant by it.

Mr. WEBSTER: With great submission to you, sir, what you are now stating is a very ordinary construction put upon an auditor—viz., that they shall have certain vouchers for certain moneys received.

The CHAIRMAN: Vouchers for all moneys received and paid.

Mr. WEBSTER: But they have no means of describing in what way the accounts shall be kept. The material inquiry for you is, as to how much of revenue may have been applied to capital. Now, assuming that a very large amount of revenue has been applied to capital, the auditors had no power to examine into that; the accounts presented themselves in such a shape that they could not possibly do it. You have a large amount of tradesmen's bills—outstanding accounts; that is, there has been in years past a large amount of revenue applied to capital. Then, in point of fact, the public have been paying very much more than they ought during that period, and, as the evidence stands, there is strong presumption that that was so.

Sir JOHN DUCKWORTH: It is a very remarkable fact that the works should be valued at £32,000, the revenue being only equivalent to two and a half of the actual gross revenue.

Mr. WEBSTER: These are matters of fact, which if the 33rd section had been carried out in its spirit would have been provided for; and the section remained practically a dead letter unless the accounts were presented in such a shape as to enable the auditors to sever what was applied from revenue to capital, and to ascertain with accuracy what was due to capital, and what was due to revenue. There is no doubt that the gas company has foiled the auditors in carrying out the section of the Act of Parliament, because this is quite clear on the accounts, that there is no means of ascertaining that. If that be so, what right have those persons to come and ask for this extraordinary provision, that they should for this long period seek to make up out of revenue this difference of £13,000?

The CHAIRMAN: The only difference is that they come for new power, but they have the power now, and we cannot take it away from them unless they choose to come for something fresh.

Mr. WEBSTER: They are coming for additional capital.

The CHAIRMAN: It may be another question—unless it is provided for in a General Act—how far they may have that power for the future.

Mr. WEBSTER: This is a matter that is constantly the subject of legislation by committees. Whenever a company come for fresh powers of this sort—repealing existing legislation—then it is open for the committee, before whom the parties come, to inquire into the whole matter. The proposition which is presented to you that £13,000 should be made up, and that the company should be entitled to charge a dividend of 10 per cent., and earn so much more than that to make up the deficiency, is rather a strong one, which I think, in your discretion, you will examine into; and, in order to ascertain what is right to be done under such circumstances, you will consider carefully what has been the conduct of that company, and whether the Act of Parliament, which was meant for the protection of the public, who are not to be required to pay more than is absolutely necessary, has not been evaded. If the 33rd section had been so inadequately expressed that the company, even within the strict letter of that law, evaded what was obviously the intention of it, you will not give the power now sought for, because it is not proposed to leave matters as they are under the existing law, and they seek to introduce a positive clause to authorize them to make up those back dividends. You will find that the clear object of the 33rd section was, that they were not to have more than 10 per cent., and then the surplus was either to go to the commissioners for the benefit of the town, or to reduce the price of gas, and in that case the inhabitants got the benefit of the reduction in the price. Now, if the accounts had been kept in such a shape that the auditors have been unable to ascertain what was fairly due to capital and what to revenue, I ask, has not the spirit as well as the letter of the Act of Parliament been evaded? Has not the spirit, at all events, been evaded? And, if that be so, will you sanction a provision to do that which, if the Act of Parliament had been properly complied with, they would not have been able to do?

The CHAIRMAN: I do not myself see that they can be compelled to surrender their own Act.

Mr. WEBSTER: You might refuse to repeal that clause.

The CHAIRMAN: Certainly.

Mr. WEBSTER: I think the most convenient course would be to put them under new legislation.

The CHAIRMAN: It would be the more simple thing, certainly.

Mr. WEBSTER: Something has been said as to what has been done in other cases about back dividends. The Metropolis Gas Act of 1860, for the better regulation of the supply of gas to the metropolis, provided that back dividends should not be made up for a greater period than six years. The principle of that Act was to prevent competition within the different parts of London, and the streets being broken up by different companies. The tendency of recent legislation was not to encourage competition in gas or water, and to say, "You shall have that particular district to yourselves, and you will be placed under restrictions. When your dividends attain a certain amount you shall reduce the price; and you shall not be entitled to make up back dividends for a greater period than six years."

Sir JOHN DUCKWORTH: It recognizes the principle of back dividends, but limits it to six years.

Mr. WEBSTER: No doubt. It was the practice of the companies to pay back dividends, and when the attention of the Legislature was directed to this fact, they held that it would be a better policy to regulate the companies by Act of Parliament than to encourage competing companies, and then they established this principle, which is equally applicable to every single district in the country as it is to the several districts of the metropolis. You will apply that principle, and in your discretion limit them to some period. Looking to the number of years during which they have enjoyed 10 per cent. dividend, and that the shares are selling at 95, I think this is a case in which you will say they have enough—that the public have paid enough. That is really the question you have to consider—whether you will allow the public to be taxed in the amount of their gas beyond this 10 per cent. Because, during the last six years, they have had their 10 per cent. I do not know how any distinction is to be drawn between this particular district of Cambridge and any district of the metropolis. The state of things is this—you are not to have competing companies, but you are to have their dividends regulated by a proper inspection of accounts, and the price of the gas reduced if they admit of it. It may be a question whether in some cases it would not be better to have a fixed price, and to improve the illuminating power; but, as is now the practice of Parliament, you shall have these companies limited in the manner I have described. Parliament has set its face against competition; that has not been for the general benefit of the public, and in the only case in which the matter of back dividends was seriously considered, namely, that of the Metropolis Act of 1860, Parliament said: "You shall not have back dividends for more than six years." That was done without reference to any mismanagement or to any complaints; but if these letters be true, it is quite clear upon that evidence and the documents before you that since 1858 there has been this contest going on at Cambridge, and extreme dissatisfaction has been felt at the conduct of the gas company, to say the least of it. Whether rightly or wrongly is not very material; but this is perfectly clear, that the accounts were not in such a shape that you could sever the money due to capital from that due to revenue. The money whereby the establishment was created is quite distinct from the money whereby, when erected, it is maintained. That is a distinction which the Legislature endeavoured in this case to provide for by providing a precise schedule on which the accounts shall be rendered. That is, no doubt, the most material question for your consideration. I confidently ask whether a company, which has evaded the Act of Parliament and refused to furnish to the auditors such accounts as they were bound to do if they are desirous of complying with the spirit of the 33rd section, occupies such a position as to be entitled to come and ask of Parliament this great favour of making up a back dividend for so many years. I think it would be a very strong measure to allow them to make up back dividends for 25 years, when the Legislature in the only case in which this question was fairly considered, limited the back dividends to six years. That is all I have to say on this part of the question; and I do not propose to address you further upon the question of illumination and price, both of which matters will be the subject of distinct clauses. The capital question will also, to some extent, depend upon your decision; therefore, as a matter of principle, I ask the court on the preamble to intimate its opinion that it is not expedient that the power sought by the company for making up the back dividends for this lengthened period should be sanctioned.

Mr. *John Eaden*, examined by Mr. COCKERELL.

I am an Improvement Commissioner, and have acted as one of the auditors of the gas company's accounts from 1859 to the present time. In 1860 we had not many facilities offered to us at the office of the company, for we were told that as there was nothing on the subject in the Act of Parliament, we could not have pens or paper, nor take any notes. I resisted that, and the manager of the company had a consultation, which lasted for some time, and then they conceded that we might take notes, on the understanding that we were not to take them away with us. I declined to accede to that arrangement. I made some memoranda, having taken paper and other materials for the purpose. That particular difficulty did not occur in subsequent years. On some occasions I have made inquiries which have been objected to by the officers of the company. I once asked Mr. Gifford for explanations as to certain parts of the expenditure. He answered one or two questions, but Mr. Adcock, senior, the solicitor to the company, interfered, and directed him to answer no more. The questions I asked fairly arose out of the items before us. There has been considerable dispute as to the item of contingencies. There was always £200 or £250 put down for contingencies. That charge was made in respect of bad debts for gas supplied. In the whole number of years the amount of contingencies was £3328 19s. 2d., giving an average rate of £166 per annum; whereas, in the two years I had to deal with the actual results the average gave £36 4s. 8d.

The company, however, took credit for the whole amount of estimated contingencies instead of actual results. It is within my knowledge that these disputes as to the accounts have extended over a long period of years. They had existed before I was appointed. The accounts had always before then been taken by both parties, under the impression that the 33rd section required that form of account. The commissioners are not satisfied with the accounts as they are stated now. We were satisfied that the figures presented were correct, and properly audited, and so on, and we audited the account in that form; but we have always attached to it, in some way or other, a memorandum that we were dissatisfied with the mode in which the accounts were kept, and that we could not get at the information we wanted.

Cross-examined by Mr. FORSYTH: I am one of the Improvement Commissioners, and was so in 1859. It was my duty, under the Act, to see that the Act was complied with as far as I could.

Mr. FORSYTH: Does not the Act provide that there shall be brought before you all books, bills, receipts, vouchers, and papers, if required?

Witness: Yes.

Mr. FORSYTH: In what single particular have the requirements of the Act of Parliament been violated by the gas company as regards their accounts?

Witness: I conceive that, under the 33rd section, the accounts are to be for the maintenance of the works, and instead of giving us a distinct account for the maintenance of the works, they always gave us an account in which the maintenance of the works was confounded with other things, and I could not distinguish from anything given to me between the two. I had the power of calling for every single bill, receipt, and voucher, but I certainly did not do so.

Mr. FORSYTH: Whose fault was that?

Witness: It was the fault of the way in which the account was kept. It is quite obvious it amounts to no account at all. The commissioners have taken the opinion of counsel as to whether the gas company have or have not properly kept their accounts? That opinion was, that the company had not kept their accounts as prescribed by the Act. We applied to them to alter the mode of keeping the accounts in this particular, that they had mixed up capital with the items for maintenance and expenditure, with which alone we had to deal.

Mr. FORSYTH: As I understand, the complaint is that the company have improperly been paying as dividend, or expending upon their works, profits which ought to have gone to reduce your rates. Could you not, if you had any suspicion on that subject by calling for vouchers and receipts and bills from the company, have ascertained upon what subjects they were spending their money?

Witness: It was possible to ascertain it, but I did not consider I had any business to do that as an auditor. It was an accountant's business. My duty was to audit the accounts brought before me, giving an explanatory resolution stating upon what subjects we were dissatisfied with the manner in which they were kept.

Re-examined by Mr. COCKERELL: We have more than once requested that the accounts should be furnished in a different form. It has been a constant source of difference between us, but we could never get it done. We have applied for an accountant to go through the accounts and dissect them, but they would never let us have one. Within the last few years it is within my knowledge that enlarged mains have been laid over the whole town; and I think in the very last account the trade bills charged amounted to £6000.

Sir JOHN DUCKWORTH: Would you have fresh capital raised for the purpose of laying down those mains?

Witness: I do not know in what way to answer that question.

Sir JOHN DUCKWORTH: The town could not be supplied without those enlarged mains.

Witness: Our contest was, that instead of increasing capital by borrowing money, they increased capital by devoting to it profits to the benefit of which the town was entitled.

The CHAIRMAN: The commissioners preferred that the old mains should be left, rather than that the new mains should be paid for out of the capital of the company?

Witness: That is not my opinion.

The CHAIRMAN: That is the inference.

The Rev. Mr. *Welden*, examined by Mr. WEBSTER.

I am incumbent of Christ's Church, in the parish of St. Andrew-the-Less, in which the gas-works are situated. The gas company manufacture tar and dispose of it. I cannot say that that has been a source of considerable nuisance, but it has been a nuisance. Whenever the wind is in the east there is a very disagreeable smell, which extends as far as my own house, which is about 850 yards away as the crow flies. There is a residuum, which is allowed to go into a field at the back of the gas-works, and the poor people about complain, especially the laundresses, that when they hang out clothes to dry, they are obliged to bring them in again soon after, they become so discoloured. The manufacture of gas tar is a nuisance to the people.

Cross-examined by Mr. VENABLES: I believe in the proposition that gas-works must be placed somewhere. All I want is security against nuisances. I am not aware that there are about a dozen sections in the Gas Clauses Act under which the company are going to put themselves, providing remedies for nuisances arising from gas. There is this speciality in our case, that I think it is a great nuisance that whenever the wind is in the east you are reminded perpetually of the presence of the gas-works.

Mr. VENABLES: You cannot get a clause to prevent the wind blowing from the east. What do you suggest?

Witness: I suggest nothing.

Mr. VENABLES: You do not suggest that the gas-works should be removed, but that the greatest possible precautions should be taken against the nuisance?

Witness: Yes; that everything should be done to prevent as much as possible the nuisance.

Re-examined by Mr. COCKERELL: I think this coal tar might be prevented from flowing into the field, and if that were done it would diminish the nuisance.

FRIDAY, MARCH 15.

Robert P. Spice, Esq., examined by Mr. WEBSTER.

I am a consulting gas engineer and valuer of gas property, and have had about 20 years experience in that profession. It has been part of my duty to value works, to examine into the management of them, and to inspect the accounts. I first became acquainted with the Cambridge Gas-Works about a fortnight or three weeks ago, when I went down to look at them. I did not make a specific valuation of them; but I made a general survey of the works, the chief object being to satisfy my mind as to their capacity. I am aware that the company's return of gas-rental for the year ending Midsummer, 1865, was £17,655. In my opinion the £4384 charged in one lump sum in their accounts under the head of "Trade bills," must include a considerable amount of expenditure which more properly belongs to capital than to revenue. To enable an auditor to ascertain what should go to capital and what to revenue, there should have been a division made in this item. It is not possible that the clear profits of the undertaking can be ascertained in the way pointed out by the 33rd section of the Companies Act, when the accounts are thus furnished with payments of this kind in a lump sum. I have inspected the accounts for 1858, 1861, and 1863, and I find in all of them there are similar large sums charged. In 1858 there is an amount of £2049 charged under the head of "Maintenance of works." Upon the face of it I should say that the three items of which it is composed belong to capital. If the ammonia-shed is new and additional, that is clearly an item belonging to capital; if the tank and gasholder are also new, and not put in the place of an old tank and gasholder, then they belong to capital. If this was a large gasholder put in the place of a small one, or an old one, then some portion of it only belongs to capital, and the same with regard to mains. If new large mains are put in the place of small ones, a portion of the expense clearly belongs to capital; if they are new mains entirely, then the cost all belongs to capital. No auditor could possibly know how to discriminate between the two from these accounts. He could only see that the items of receipt and expenditure were properly vouched. In 1861, under the head of "Tradesmen's accounts," there is a sum £4391 15s. 11½d. It is simply absurd to suppose an amount like that belongs exclusively to revenue when the whole of the earnings of the company were only £13,942 6s. 7½d.; it must include some charges which properly belong to capital. In 1863 there is a similar state of things, but not to so large an amount.

Mr. WEBSTER: Would it be possible, with such a statement of accounts, to separate capital and revenue charges so as to adjust what is due to dividend only in order to ascertain whether there was any surplus?

Witness: It could not be more effectually concealed than it is.

Mr. WEBSTER: Now you have had a great deal of experience in testing the value of works as compared with revenue. Is there any tolerably well-known rule you can lay down for ascertaining whether the affairs of a company are properly conducted?

Witness: The rule I have established in my own mind, as the result of constant observation, is that the structural value generally amounts to something like five or six times the amount of the gas-rental—that is to say, that works cannot be constructed properly but at some such cost as that. The general rule is that from four to six times the amount of the gas-rental is the structural value; that has been found to be the case generally throughout the country. If it is less than four it is a very exceptional case, and when it amounts, as it does sometimes, to seven, eight, or nine times the amount of the revenue, then we say that there is too much capital employed, and the profits must be small in proportion. No gas engineer would have any difficulty in ascertaining what would be due to capital and what to revenue, but an ordinary auditor might. If the court should think it material, with reference to the question of these back dividends, or to a proper statement of accounts, the books of the company would afford the means of ascertaining what was properly due under each head. I have no doubt, from the character of the items exhibited in the balance-sheet returned by the company to the Improvement Commissioners of Cambridge, that there has been an excess of expenditure out of revenue to the capital account. I see similar accounts under the heads of tradesmen's bills and the item of wages. Assuming that the company has, within the strict letter of the law, furnished no other accounts than those they have already furnished, it is not possible for the auditors to discharge their duties satisfactorily under the 33rd section of the Act—I mean that they could not distinguish as to what the profits were.

Cross-examined by Mr. FORSYTH: I was first engaged in this matter within the last month. I was at Cambridge two days. I went once to the gas-works and made a general survey of them. I was not on the works more than an hour, perhaps not more than half an hour. That is the whole extent of my knowledge about them, so far as ocular observation goes. The rest of my knowledge of the affairs of the company is based upon an examination of their accounts.

Mr. FORSYTH: Now I should like to know your opinion as to what is properly due to maintenance, what to revenue, and what to capital. Supposing, for instance, a retort-house is out of order, and new repairs are made, ought that properly to be attributed to capital or to revenue?

Witness: You speak of "new repairs;" repairs are always new. Repairs clearly belong to revenue.

Mr. FORSYTH: Supposing that a retort-house falls down, and has to be rebuilt, is that a capital or a revenue charge?

Witness: That is maintenance.

Mr. FORSYTH: Supposing that a railway company find their rails worn out, and substitute steel rails for iron, is that to be put down to capital or revenue?

Witness: That is revenue.

Sir JOHN DUCKWORTH: I think we had better not go into the question of railway works; there is a great difference of opinion upon that subject.

Cross-examination continued: I do not know that any new structure erected by the company would necessarily come under the attention of those who examined the accounts year by year, or that the auditors would necessarily know when looking over the accounts whether the items charged belonged to capital or to revenue. If the earnings of a gas company were applied for a certain number of years to new structures, the value of their works, properly kept in repair, ought at the end of that time to exceed the amount of their capital. I do not know it would necessarily furnish a strong inference that revenue had not been improperly applied to works, if a competent person who had actually examined those works told me that they now represented a less amount than the capital originally expended upon them. There is all the difference between employing the money properly or improperly whether the value of the works would be increased; the company might have managed badly, of course, if not badly managed, and all things being equal, the result would be to increase the value of the works. The 33rd section of the Act is a very stupid one. The letter of that section has been complied with, but the spirit of it has been evaded. When larger mains are substituted for smaller, a proportion of the cost should be charged to capital. The proportion must depend upon the circumstances of the case. If a 3-inch pipe is taken up and a 10-inch pipe put down, I should think, speaking in round numbers, it would be fair that about four-fifths of the cost should be charged to capital. I cannot say whether this is ever done by railway companies. I am aware that in the case of the Cambridge Gas Company the item of tradesmen's bills includes the cost of putting up fittings, as there is a fitting trade mixed up with the gas business. On the opposite side of the account the sums received from customers is credited, which to that extent reduces the charge for "tradesmen's bills."

The "wages" belong both to capital and revenue. If men are employed in putting up a gasholder or building sheds, or putting up works belonging thereto, their wages belong to capital. If a contractor puts up the additional works, no item would appear for wages in respect of them in the accounts. It does not, however, necessarily follow that if "wages" appeared in the account they would be wages for maintenance. If new mains were laid the company would employ their own men, and their wages would be charged to capital, just the same as the account of the ironfounder for making the mains. There is strong presumptive proof, from some large purifiers I saw on these works—comparatively new purifiers—that they were not provided for out of capital. I can find no account of capital having been expended on new purifiers. I do not know when they were erected. I have the accounts here, and I do not see any statement of a call having been made.

Sir JOHN DUCKWORTH: There is an account of one, in the paper handed to me, for 1861.

Witness: I had observed that, but had forgotten it. In 1861 there was a call of £1 on the £8 10s. shares. It is a very insignificant sum. I ascertained that the new purifiers were erected in the place of smaller ones.

The CHAIRMAN: We may take it that as the consumption increased they must enlarge their works.

Cross-examination continued: I saw the ammonia-shed. I have not made a valuation of it. The cost is given in the account—"Shed and apparatus, £350 15s." The shed might cost about as much as the apparatus.

Re-examined by Mr. WEBSTER: I could see the capacity of works of that class in half an hour. The number of retorts and the size of the gasometers are elements for that purpose. The manager very courteously gave me the size of the gasholder and the number of the retorts. Having ascertained the quantity of production and the amount of consumption, I am enabled to form a judgment of the capacity of the works. In the ordinary course of things, if the business of a gas company is increasing, when they put up new purifiers in place of old ones, they would put up larger ones, charging the proportion of cost due to the increased size to capital, and the remainder to revenue. I think the new purifiers were 14 feet square. I heard the report of the auditors, dated Feb. 1, 1861, read yesterday, in which they complain that it is impossible to audit the accounts satisfactorily without further information. From what I have seen of the accounts, I concur in that report. In that report there is the following paragraph:—"The certificate purports to be the amount of the actual receipts and actual expenditure; but in truth it is neither, the so-called receipts being the sums charged for the gas and other commodities sold, with a reduction of estimated sums for contingencies, of bad debts, &c., amounting in the past year to £250; and the so-called payments being the amount of bills incurred by the company during the year, whether paid or not. The effect of the company's mode of making out their balance-sheet is that it is impossible to audit satisfactorily the accounts of any one year without going into and comparing them with the accounts of other years, to ascertain whether the contingencies are correctly estimated, and that the bills are not charged twice, once as bills incurred and once as bills paid." I think that is correct, but my complaint would be rather that the accounts are not properly divided—that the sums chargeable to revenue are not kept separate from the sums chargeable to capital.

Mr. WEBSTER: Let me read this:—"With reference to the report of the auditors of the 28th of October, 1859, suggesting that communications should be entered into with the company to ensure that for the future the capital account of the company should be kept distinct from the current expenditure, it does not appear that any step has been taken by the Improvement Board, nor has any alteration been made in the company's mode of keeping the account. An attempted inquiry, with a view to analyze some of the items of the year's expenditure, was stopped by the clerk, who instructed the superintendent to decline to answer any questions upon the subject." My learned friend has asked you whether, upon an examination of the accounts, you could have ascertained the facts. Does your experience enable you to concur in the paragraph I have read from the auditors report?

Witness: Certainly.

Mr. WEBSTER: You were asked about the call of £600 in 1861. I believe the cottages were purchased in the year 1861.

Witness: I believe they were.

Sir JOHN DUCKWORTH: You do not know it, I suppose?

Witness: You will see it in the balance-sheet.

Thomas G. Barlow, Esq., examined by Mr. WEBSTER.

I am a civil engineer, and have had considerable experience. I heard the evidence of Mr. Spice, but I do not quite concur with what he said as to structural value and the proportion it may bear to the ordinary revenue in gas-works. I do not think that you can lay down any general rule on that point; each case must stand upon its own footing. Of course, the price of gas is an element; if you sell it at one price you have one proportion, and if you sell it at another price you have another proportion. I have paid attention to the 33rd section of the Act of this company. I do not think it possible for the auditors to ascertain the surplus profits of the company except they have a detailed account of what belongs to capital and what belongs to revenue. The 53rd section requires that the accounts shall show the charges and expenses attending the supporting, maintaining, and using. The accounts which I have seen mix this up with the extensions; they ought to show what is applicable to revenue and maintenance, and what is applicable to capital and new works. Unless it is done so, the profits of the company cannot be ascertained in accordance with this section. The old purifiers, I think, were smaller than the new one, which measure 14 feet in diameter; but I do not wish to be pressed upon that point. Assuming the new purifiers to be twice the size of the old ones, it would not be quite right to charge half the cost to capital and half to revenue, because the cost of the smaller purifiers would be larger in proportion than the new ones—perhaps two-thirds.

Cross-examined by Mr. VENABLES: I have not examined the Cambridge works for some years. I made a valuation of them upon the part of the company in 1859, I think. I stated in my examination that I did not concur in Mr. Spice's opinion as to any general rule by which the value of works can be ascertained upon the basis of the gas-rental. It may be three years in some cases, and five and six or seven years in others. I see by the accounts of the company that there have been new gasholders and other things, which are clearly extensions. If the structural value of the works is not increased by the outlay upon them, I should say that the outlay was not chargeable to capital. If a purifier were put up which was identically of the same size and construction, then the cost of it would go to revenue; but if it was a purifier four or five times the size of the one which it replaced, then the cost minus the original cost of the purifier would go to capital. I saw the purifiers in 1859, and I know what they are now. They are 14 feet square, so that they are very much larger.

Mr. SCOURFIELD: How much?

Witness: Four or five times.

Cross-examination continued: No doubt if the other purifiers had been left the gas would have been foul. I did not test the gas in 1859. My object was merely to make a valuation of the works, and I made no experiments upon the quality of the gas. No doubt the purifiers of that period were too small. Whatever is added to the works in the shape of extensions and improvements that go to increase their value should come out of capital. Constant extensions are taking place in gas-works, and I have no doubt that in Cambridge the consumption of gas has doubled in the last ten years, and very likely the works have been doubled all the way through.

Mr. VENABLES: What I want to know is this, and I must rather press you upon it—supposing, without any view of obtaining additional profit to the company, but merely for the purpose of supplying the public better, they expend money in providing improved machinery and larger purifiers, ought they to be deprived of the benefit of the revenue from that?

Witness: If, by such extensions, they can supply an increased demand of, we will say, double that which they were originally supplying, then the increased value of those extensions should come out of capital.

Mr. VENABLES: Supposing they do not supply a larger district—supposing they supply the same district and the demand remains about the same, would you still say that giving a better supply ought to involve a burden upon them in the shape of diminishing their profits?

Witness: The question you ask supposes an impossibility. There are no gas-works that stand still; there are some that I know of that are in a constant state of increase at the rate of 10 or 15 per cent. per annum.

Mr. VENABLES: Putting it as a hypothetical question, if the object is to provide the existing district more advantageously to the public, and if that provision entails a charge upon the company, ought that to be charged to capital or to revenue?

Witness: If, by the improvements and alterations which you suggest, an increased quantity of gas were supplied, then the cost ought to come out of capital. I cannot answer the question in any other way.

Mr. VENABLES: Suppose that you find the gas to be impure, and a large sum is expended in making it pure, ought that to be charged to capital or revenue?

Witness: The question of pure and impure gas affects solely the purifiers, and if, by the addition of larger purifiers, you can make the gas pure, then I say that the increased cost of those purifiers, above that of the original ones, should be added to capital.

Mr. VENABLES: Then does it not occur to you that the consequence of that is to be constantly putting a penalty upon the company for improving the quality of their supply?

Witness: You put no penalty upon the company if, by penalty, you mean providing the apparatus and means by which they get gas of a purer quality.

Mr. VENABLES: What I mean is depriving them of profit which otherwise they would be entitled to derive.

Witness: No; they are not entitled to derive a profit which they may make by illegitimate means—that is, by supplying gas of impure quality.

Mr. VENABLES: Supposing that they did not raise the price, or increase the quantity, or improve the quality, ought they to incur a penalty for doing that?

Witness: They ought to take out of capital the expense of the apparatus necessary to enable them to do so.

Mr. VENABLES: Will you tell me why it should be so? On what principle ought it to be so?

Witness: A gas company is incorporated to supply a public want, that public want is the supply of gas of a proper and pure quality; they are not incorporated to poison the public with impure gas.

Mr. VENABLES: You are aware that, in all these cases, it is assumed to be the interest of the company, with reference to their accounts, to charge expenditure against revenue rather than against capital.

Witness: It is the interest of the company to do so, but it is not to the interest of the public they should. The interest of the public is that there should be a fair division of the charge.

Mr. VENABLES: Supposing it to be the interest of the company to charge it against revenue, ought you to make it their interest to effect no improvement in the supply?

Witness: Decidedly not.

Mr. VENABLES: But, if you charge to capital the cost of every improvement, you set the interest of the company against the interest of the public.

Witness: No, you do not; because, if the company expend money in extensions or improvements, they extend their business by it.

Mr. VENABLES: I am speaking of extensions; I am not speaking of better business. In the Metropolis Gas Act, is it not allowed to make these alterations and charge them upon revenue?

Witness: No; the metropolitan gas companies are under the Gas-Works Clauses Act, and all extensions made by them must necessarily come out of capital.

The CHAIRMAN: Have they power of raising capital for new works?

Witness: Yes they have.

Mr. VENABLES: Have you seen the form of accounts framed under the Metropolis Gas Act by the authority of the Secretary of State?

Witness: I have.

Mr. VENABLES: In that schedule of accounts are not improvements of this kind charged to revenue?

Witness: No.

Re-examined by Mr. WEBSTER: I am not aware of any other penalty upon the company in this matter than that it requires them to carry on their business in pursuance of the provisions of the Act of Parliament. One of the great complaints against gas companies in general is that they call up capital for extensions which are unnecessary. In this case, the penalty is one they bring upon themselves by not coming to Parliament earlier. All gas companies are in a state of accretion, and have a growing trade. The consumption of gas increases generally at the rate of 10 per cent. per annum, and the works require to be increased from time to time, to meet the additional quantity required. This extension of works should come out of capital, and not out of revenue.

Mr. WEBSTER handed in the report of the auditors for 1859, and stated that that was the case on behalf the opponents of the bill.

Sir JOHN DUCKWORTH (to Mr. Hawksley): With reference to the Darley Main Colliery, can you tell me how much gas per ton that coal is calculated to produce?

Mr. *Hawksley:* 9200 feet per ton.

Mr. FORSYTH having been heard in reply,

The CHAIRMAN stated that the court were of opinion the preamble of the bill was proved, subject to amendments.

The clauses were then proceeded with, and clauses 1 to 21 agreed to.

On clause 22, empowering the company to raise an additional capital of £50,000, the following evidence was given:—

Samuel Peed, Esq., examined by Mr. FORSYTH.

The object of putting in those parishes which are named in the bill was to enable the company to supply any public building that might be erected in any of those parishes, but they never contemplated supplying all those parishes. In the case of a building in one of those parishes, Fulbourne Lunatic Asylum, we supplied that with gas for some few years. After we had supplied them we were threatened with an indictment, because we had not the power to supply any buildings in that parish, and we simply put this in to remedy such a matter as that, and we agreed to the requisition of two or three petitioners. The university petitioned against this bill, and also these petitioners, and we consented to withdraw those parishes.

The CHAIRMAN: The amount of capital you fix—viz., £50,000—was not with reference to those parishes.

Witness: No; not the entire supply, but simply the supply of any public buildings that might be erected in them. In my opinion, from my knowledge of this gas company, the sum of £50,000 is required for new works within the limits of their present Act.

Sir JOHN DUCKWORTH: I should like to have that explained a little. At this moment the existing capital of the company is £37,500, and the district is not enlarged by this bill at all. Is the existing area now insufficiently supplied with gas?

Witness: Undoubtedly. The buildings are very extensive in two or three parts of the town, and where there are no pipes at all the buildings are going on now to a considerable extent, and we shall want new mains for the purpose of supplying those several streets and buildings.

By Mr. FORSYTH: Beyond the point to which our existing lighting now goes, we have the power, within the limit of our Act, to extend for nearly a mile. The town may extend in those directions, and we may be required to supply gas there a mile from the outward boundary of the borough.

By Sir JOHN DUCKWORTH: A large population within the district which is under the existing Act is at present not supplied.

By Mr. SCOURFIELD: We cannot supply the lunatic asylum. We should have been glad to do so; it is three miles off.

Cross-examined by Mr. WEBSTER: The lunatic asylum is at Fulbourne. They make their own gas.

Mr. WEBSTER: Then you do not want to do that?

Sir JOHN DUCKWORTH: They are confined, of course, to their district.

Mr. *Richard Reynolds Roe*, examined by Mr. WEBSTER.

I have been town surveyor of Cambridge for 17 years. At present there are pipes and mains in nearly every street. It is not customary to have gas in the rooms in the colleges—only on the staircases and in the courts. I do not know of any instance of gas being in any of the rooms of the university.

Mr. WEBSTER: Your attention has been called to this request to have an increase of capital to the amount of £50,000. From what you know of the present supply of Cambridge and the state of the town, knowing too that the limits are not to be increased, can you suggest any reason for the application for that large amount of capital?

Witness: It does not appear to me how the money can be spent at all if raised.

Mr. WEBSTER: When power is given to raise capital, it is generally spent with people paying 10 per cent. in some way or other. You, at all events, as surveyor of the town, and having great experience, do not see in what way that large amount of £50,000 can be applied?

Witness: I do not.

Cross-examined by Mr. FORSYTH: I do not know that the actual increase in the consumption of gas every month in Cambridge is a million cubic feet. The town is increasing considerably in several directions. There is a great deal of building going on near the railway, and in other directions too. I do not know that the authorities are introducing gas into the undergraduates rooms. I know there is a large district beyond where the company's mains are now laid, which they could supply under their Act if houses sprang up to require them to do so. In the Trumpington Road a great many new villas have been built within the last few years—nearly all the ground is occupied.

Re-examined by Mr. WEBSTER: The Gog Magog Road, as far as the railway station is all built upon. There will be some buildings beyond the station. The company's mains go beyond the railway bridge into the parish of Trumpington. There are two new streets being made between the Trumpington and the Hills Road. The company have mains there for the public lamps.

Mr. FORSYTH having addressed the court in support of the clause,

The CHAIRMAN said the referees were of opinion that the capital should be left as it stood in the bill.

Upon clause 46,

Mr. WEBSTER proposed to insert the words, "under a pressure of not less than 6/10ths of an inch of water," and in support of the proposal called the following evidence:—

Mr. R. P. Spice recalled, and examined by Mr. WEBSTER.

Six-tenths of an inch is the minimum pressure introduced into gas Acts, but between the hours of dusk and eleven o'clock at night I think the minimum pressure should be 1 inch; at other times 6/10ths of an inch. When the pressure is only 6/10ths in the main the light is feeble at the burner.

For the company,

Mr. *Hawksley* recalled, and examined by Mr. FORSYTH.

There is no objection to 6/10ths for the day, or even 7/10ths, which I think would be better than 6/10ths; but there is great difficulty about the night pressure, which must depend, at remote points, upon the rate of consumption All that would happen is this, that if a person put up more lights the company would be obliged to take up their mains and replace them with others, and perhaps for a very insignificant result, and that would put the town to a considerable expense. It is really a public question.

Cross-examined by Mr. WEBSTER: There is no difficulty in giving 7/10ths in the day, and there ought to be always 7/10ths at night. No doubt that is the minimum pressure at which the gas ought to be supplied. There need not be an inch pressure between sunset and eleven o'clock at night. If the pressure at all times is sufficient to give 7/10ths to every consumer that is enough.

Mr. WEBSTER said he should be satisfied with that, and the clause was amended accordingly.

On clause 53,

Mr. WEBSTER proposed that if the price of 4s. for gas was retained, then that when the maximum dividend of 10 per cent. was reached the quality of the gas should be increased to 16 candles in place of a reduction of price.

Mr. *Spice* recalled, and examined by Mr. WEBSTER.

Mr. WEBSTER: We will begin with the price clause first. I should propose to amend clause 57 in this way—"the maximum price at which gas shall be sold shall not exceed 4s. per 1000 cubic feet." Has your attention been called to what I will call the policy of a less price than 4s.—a reduced price, or a certain increase of illuminating power in the event of surplus profits being obtained by the gas company?

Witness: I think it would be far more preferable for a town like Cambridge that it should have a better article than a cheaper.

Mr. WEBSTER: Do you conceive that the price will be reduced below 4s. if the illuminating power is not increased?

Witness: It is certain to be so.

Mr. WEBSTER: On the whole, do you advise, looking at the position of the town of Cambridge, that the price should be left at 4s., and that the surplus profits should be applied in increasing the illuminating power of the gas to 16 candles?

Witness: I think it would be a great gain to the inhabitants to have a better article than a cheaper. With regard to the purity, the clause we propose is a common one, similar to that in the Metropolis Gas Act, and which is introduced into all recent gas Acts.

Cross-examined by Mr. VENABLES: Have you any precedent for this plan of applying the surplus profits to increasing the illuminating power?

Witness: No; it is a suggestion of my own.

Mr. VENABLES: It is urged that we ought to adopt the clause with regard to purity because it is in all the gas Acts, and that this we ought to adopt because it is in none of the gas Acts.

Witness: Not because it is in none of them, but because it is suggested by me.

Mr. VENABLES: I dare say you do not know it very well, but there may be among the inhabitants of Cambridge perhaps a majority who care more for their money than their eyes. Will you tell me how you propose to settle this: Supposing that there is a small surplus profit after paying the maximum dividend, as the clause stands that would be applied immediately to a reduction of price, but the 2 candles additional illuminating power would be a very heavy charge, and might very much exceed the amount of surplus profits. How do you propose to adjust that?

Witness: I should not make any alteration in the illuminating power till the profits were sufficiently in excess as to afford it. I believe the price of gas in Cambridge will very soon fall to 3s. 6d. per 1000 feet.

Mr. VENABLES: I understand you to agree with me that the company ought not to apply to an increased illuminating power more than the surplus over their maximum dividend?

Witness: No.

Mr. WEBSTER: In practice, perhaps, there are always difficulties, but is there any more difficulty in applying a sliding scale to candles than to price?

Witness: No.

Sir JOHN DUCKWORTH: It is not a sliding from 14 to 16; you go to it at once.

Re-examined by Mr. WEBSTER: It is more a visionary than a practical difficulty, because, as I understand Mr. Hawksley's evidence, the gas from the coal used at Cambridge has an illuminating power of 16 candles already to begin with, and I want to have the 16 candles extended to all in a certain event. The increase of cost between 14 and 16 candles might practically be put at 3d. per 1000 feet, seeing that they use coal now which produces 16-candle gas—a very small quantity of tolerably good cannel would bring it up to the difference. There are instances in Acts of Parliament where the illuminating power of gas is fixed higher than 16 candles, but not in such cases as this. The quality put into an Act of Parliament is naturally dependent upon the gas which is producible from the coal used in that district; whatever it may be in the cannel coal district, it is of higher quality than that in the Newcastle district. Cambridge appears to me to have an advantage over Brighton in point of situation for supply of coal. They get the Darley Main coal, which makes better gas than the Newcastle. In the Brighton Act the town-clerk was empowered to require 15 candles, and in such a case the price was to be increased. If it were left to me to choose for Cambridge, I should prefer an increase of illuminating power to 16 candles rather than a reduction of price.

Mr. *Hawksley* recalled, and examined by Mr. VENABLES.

I have heard the proposal of the last witness, that when the maximum dividend has been attained the surplus profits should be applied rather to increasing the illuminating power than to reducing the price of gas. In the first place, it would not do to increase the illuminating power, and therefore the cost, by a jump from 14 to 16 candles, because there might be only a small surplus profit. This proposition would entirely repeal the Gas-Works Clauses Act, because it ousts the jurisdiction of the recorder. The recorder is required to say, when there is an excess of profits, what shall be the price of gas for the future, whereas here it says that the quality shall be altered. The recorder would have no jurisdiction in that. This would be an entirely exceptional provision.

The CHAIRMAN: It seems to be very difficult to meet that objection. We could have no power to frame a clause to compel the recorder to carry this out.

Mr. WEBSTER: I think that is advisable about limiting the jurisdiction of the recorder.

Witness: Perhaps you will allow me to explain that I was in the case of the Brighton Gas Act. The clause in the Brighton Act has a provision for an increase in the price; but here it is a provision for an increase in the illuminating power without any increase in price. It is a totally different case. The Brighton clause leaves the jurisdiction of the recorder quite untouched.

Sir JOHN DUCKWORTH: Which is the clause about the recorder in the Brighton Act?

Witness: You will find it in the 35th clause. It applies to the Court of Quarter Sessions, and in Cambridge that is a separate court.

Mr. WEBSTER: I will meet my learned friend in this way. We will assent to the 4s. on the condition of section 53 being altered from 14 to 16 candles, and will take it at 3s. 6d. for 14-candle gas; 3s. 9d. for 15-candle gas; and 4s. for 16-candle gas, and adopt the Brighton clause *mutatis mutandis*.

Sir JOHN DUCKWORTH: With regard to candles, the question is where the test is to be taken?

Witness: Yes; that makes 6d. per 1000 difference.

Cross-examined by Mr. WEBSTER: I was not the engineer of the Brighton Gas-Works, nor did I advise this clause; it was a bid for admission. There were two companies in Brighton, and a third company coming in bid high for admission. I advised a clause with regard to the increased price per candle, as I thought it was a just thing to both parties.

Re-examined by Mr. VENABLES: My evidence yesterday, which has not

been disputed, goes to this point—14 candles near the works at 4s., and an increase in price for an increase in the price of coals.

The CHAIRMAN: Of course, a very great point depends upon where the testing apparatus is fixed. Mr. Hawksley said yesterday that he thought 1000 yards from the works a fair distance; but then he would require 2 candles for that.

Mr. WEBSTER: We should propose the town-hall as a testing-place, which is more than 1000 yards from the works.

Witness: What I said was, that for the purpose of inflicting penalties it ought not to exceed 14 candles at the testing-place, because the company would be obliged to deliver it at 15 candles or more from the works in order to escape from the penalty, because you cannot make different people see with the same eyes, and the photometric experiments are not so correct but that there would be great difference of opinion.

Mr. VENABLES: Assuming it to be tested at a point about 1000 yards, or more than 1000 yards from the works, what ought to be the power required at the testing-place?

Witness: 14 candles; but I would recommend the company, if both parties would agree (and I think it is quite reasonable), to give 14 candles at the testing-place, providing these gentlemen will consent, upon the other question of price which is involved, to the extent of 6d. It is unfair to say that the company should have a lower price than 4s. and still be obliged to give an illuminating power of 14 candles in the centre of the town. I mentioned that the company might consent to make it even 14 candles in the centre of the town, provided they had a fair price for doing so; but the proposal of the opponents amounts, in fact, to confiscation. I did not say that 4s. should be taken as the maximum price. I cannot adhere to that when I know that coal is rising in price every year, and that the average over the last 10 or 12 years has been 3d. per ton per annum, and it is going on so that it is impossible that the company will, for many years, be able to supply it at that rate. I have looked at the clause as it has been printed and as it is now proposed—that is, that the present maximum should be 4s., and that as long as the price of coals exceeds 14s. per ton they are to increase the price of gas at the rate of 3d. per 1000 feet for every 1s. in the price of coal per ton. Let me explain how that will operate. The gas company, if they are required to give 14-candle gas in the middle of the town, which I do not think unreasonable, would be obliged to import cannel into their manufacture. They must send the gas out at 16 or 17 candles from the works, which will augment the cost very seriously, and it may be that it will bring the price then not to 4s. but to 4s. 3d. But what I understand these gentleman want is, that they shall have all the advantage of this kind of legislation, and that we shall have no protection against the increased cost of coal.

Sir JOHN DUCKWORTH: Where is the present testing-place? It is in the middle of the town, is it not?

Witness: At the works. The gas office is exactly opposite Sydney College, in the centre of the town.

Mr. VENABLES: There is another clause which my learned friend proposed about purifying. What have you to say to that?

Witness: There is no objection to that clause, provided that the mode of testing for sulphur is stated. It is usual now to adopt Dr. Letheby's test, and if you insert that in the bill, that will do. That is a proper way of describing it, "Dr. Letheby's test," and there is good reason for that, for the difficulties about determining the amount of sulphur are so great that there is no saying how much sulphur chemists may discover in future times by a different process. The Birmingham Act contains that clause.

Mr. WEBSTER: We have no objection to that clause. We propose, then, that the price is to be 4s., with the increase after the maximum is attained, from 14 to 16 candle gas.

The CHAIRMAN: Where is the testing-place to be?

Mr. FORSYTH: At the town-hall?

The CHAIRMAN: If the test is to be at the town-hall, we think 14-candle gas enough.

Mr. FORSYTH: We propose that, if the price of coal should rise to the extent of 1s. per ton, then there shall be the power of increasing the price of the gas 3d. per 1000 cubic feet.

The CHAIRMAN: It is such a very unusual provision, that I do not think the court would be inclined to concede it.

Sir JOHN DUCKWORTH: How many cases are there to your knowledge, Mr. Hawksley, in which such a clause as to price has been introduced?

Witness: Very few; indeed, I do not think there is more than one case. The usual rule is to give rather a wider margin, instead of making it dependent upon the price of coal.

The clause, as amended, was agreed to.

Mr. WEBSTER proposed a clause for preventing the manufacture of residual products upon the present site of the gas-works, and cited the Brighton Act in support of his proposal.

Alderman *Apthorpe*, examined by Mr. WEBSTER.

I am well acquainted with the site of the present gas-works. There is a great nuisance from the residual products being allowed to escape. Some time since I had a petition sent to me to present to the Improvement Commissioners Board, of which I am a member and have been for many years. It was signed by many of the inhabitants round about there, complaining of the stench caused by the gas-works. A committee was appointed to go to the works as a deputation, and we met Mr. Gifford there, who showed us over them. I then learnt for the first time (I was not aware of it before) that, instead of tar being sold as tar, it was converted into three different articles—viz., pitch, creosote, and naphtha. The creosote was left in a circular pan, I should say, of perhaps 10 feet in depth, open, and exposed to the atmosphere. I put my umbrella in, and it produced a very nasty smell, such as I have smelt at my house, although I am a long distance from there. I am 800 yards from the gas-house. The still from which the naphtha was made also threw off a very strong smell. As to the pitch, of course there was nothing from that. We then went over the other parts of the works, and we could find nothing particular there; but at times the lime—which is used, I believe, for the purification of the gas, is allowed to remain, and that also throws off a nasty effluvium. When we have an easterly wind, I am obliged to have my doors and windows shut up, and so are all my neighbours. In fact, on many occasions it has been so bad that I thought the sewers had been opened, and that the workmen had been at work at them. There was a bone factory within 300 yards of us, but we compelled the owner, under the Nuisances Removal Act, to remove his works into the parish of Cherry Hinton. We want to have the offensive portion of the gas manufacture removed also.

Cross-examined by Mr. FORSYTH: We find the power we had under the Act of Parliament sufficient to get rid of the bone nuisance. There is a soap manufactory in the neighbourhood, close to the river-side, below the gas-works, but it is a very small concern. I have said that I would never rest till the gas-works were taken out of the hands of the company and put into the hands of the commissioners. We are nearly poisoned there, and it is a matter the company might remedy without any trouble at all. We cannot get at them, or I would not have taken this trouble. The company undertook to cover over the creosote. I do not know that it has been done; I have not been there since. It is about a year and a half or two years since the petition was presented to the commissioners. I hope the committee will do something to prevent the nuisance.

The CHAIRMAN: We can do nothing but leave you to your legal remedy.

Witness: I am very sorry for it; that will be nothing. The gas company have always treated us in such a way that it is quite useless to remonstrate.

Mr. WEBSTER proposed a clause providing that all new shares created should be sold by auction.

After hearing Mr. VENABLES in opposition,

The CHAIRMAN said the referees did not see any reason for departing from the ordinary course prescribed by the Companies Clauses Act.

Mr. WEBSTER said he had a clause to propose respecting the conversion of borrowed money into capital, but, after the decision just come to, he should not trouble the referees with it. He wished to bring up a clause providing that the company should submit their accounts to the Vice-Chancellor, &c., in the form prescribed by the Secretary of State under the Metropolis Gas Act, and scheduled in the Brighton and Birmingham Acts.

Mr. FORSYTH thought they had had enough of the 33rd section of the old Act, and his learned friend on the previous day gave it up, saying he was glad it was repealed, and the company were to be brought under the provision of the General Act in this respect. But he now sought to re-enact that section in its most odious and offensive form.

Mr. *Barlow* recalled, and examined by Mr. WEBSTER.

I have had considerable experience in the operation of the accounts clauses of the Gas-Works Clauses Consolidation Act, and I have heard of this happening—that parties have maintained they have complied with the provisions of that Act by simply filing an account with the total amount received on one side and total amount disbursed on the other. There is a special schedule attached to the Birmingham, and Brighton, and other Acts of Parliament, in which the form of accounts to be rendered is prescribed.

The CHAIRMAN: How can that be done if the total receipts and expenditure are to be set out under the several distinct heads?

Witness: Under the distinct heads of "Receipt and expenditure"—only those two words—I have known instances in which the accounts lodged with the clerk of the peace has been in that form. Of course that was not the meaning of the Act, but I know it has been successfully contended that it was the meaning.

Mr. WEBSTER: You having known that done, has it become necessary, in your opinion, and has it been the practice in recent Acts of Parliament, to remove any uncertainty by putting in a schedule of such a kind as that which is laid before you?

Witness: It has been done in many cases, and I have never known an instance in which it was resisted when it was asked for.

Cross-examined by Mr. FORSYTH: I am aware that in 1847 a General Act was passed applicable to all gas companies. The question was then considered as to the mode of keeping the accounts, and a section in that Act provides the way in which it shall be done by all those companies in whose Acts that Act was incorporated. Knowing what has been the working of that section during the last 20 years, I am of opinion that the General Act should be amended. The 38th section enacts that "the undertakers shall, in each year, cause an account to be prepared of the total receipts and expenditure of all rents or funds levied under the powers of this and the special Act under the several distinct heads of receipt and expenditure." I do not think that section sufficiently provides for a distinct enunciation item by item of the receipts and expenditure; it says an abstract. I did not hear Mr. Hawksley state yesterday that there were infinitely more cases in which such a schedule as is now proposed had not been added than those in which it had been added. I was not in the room when Mr. Hawksley was examined. I should think in ten or twelve Acts within my knowledge it has been added, and I do not know that the companies resisted in either of them.

The CHAIRMAN: Under the General Act who are the parties to whom the accounts are sent?

Witness: The clerk of the peace for the county.

Mr. FORSYTH: Just observe, the whole importance of this question is that there shall be a reduction in the price of gas, because the Improvement Commissioners do not pretend now to have any claim to the surplus profits. I find in the General Act that the court of quarter sessions may upon the petition of any two ratepayers appoint a competent person to examine and ascertain the actual state and condition of the concern.

Witness: It is a provision that no one has ever dared to act upon in consequence of the succeeding section, which provides that if upon any such petition it shall appear to the court that there is no case, they may, if they think proper, order the petitioners to pay the costs.

Mr. FORSYTH: That is, at all events, the general legislation of Parliament with regard to cases of this sort, and you want to make a special exception against the Cambridge Gas Company.

Witness: No; but I think the consumers of gas should have before them such an account as will show whether it is worth while or not to go to the quarter sessions.

Mr. FORSYTH: Therefore you would repeal the General Act.

Witness: I would amend the General Act.

Mr. WEBSTER: My learned friend is very strong about repealing the General Act. I understand you to say that these words of the 38th section of the General Act, "distinct heads of receipt and expenditure," have been interpreted in such a manner that accounts have been given in which are of no use?

Witness: Yes; I have seen an account which has been comprised in two items, one total on the debit side and one total on the credit side.

The CHAIRMAN: The referees do not see any objection to the accounts being made out in the form proposed. They think they ought to be made out in such a form as to be understood by every one. But they do decidedly object to their being submitted to an audit such as proposed. Our inclination would be to adopt the form of account, but that it should be merely sent to the clerk of the peace in the ordinary way. We object altogether to the accounts being sent to the Town Commissioners; that has been the cause of all the disputes.

Mr. FORSYTH: I hope you will not adopt the schedule without some explanations from us.

The CHAIRMAN: I think there should be a fair and full account which every one can understand.

Mr. *Hawksley* recalled, and examined by Mr. FORSYTH.

None of these schedules agree one with the other, and the difficulty is

this, that by prescribing the particular items to be included, the presumption is raised against the company that any other item of expenditure is not legal.

The CHAIRMAN: We think it most essential that the Town Commissioners and the Town Councillors shall have nothing at all to do with the auditing of the accounts whatever.

Mr. WEBSTER: I should think that Mr. Hawksley and Mr. Barlow can improve the form.

Witness: Suppose I could, unless there was something put into the Act to the effect that the form should not necessarily be followed in all particulars, or that other items of expenditure might be included, what would be the result? Why, that a presumption should be raised against any other items than those specified. For instance, this company has worked hitherto without paying the directors. I will assume that they should hereafter pay their directors. It is only a thing that comes into my head by illustration. They can do that under the Companies Clauses Act, but there is no provision in this schedule for that purpose.

The CHAIRMAN: There is in this schedule, "Salaries and payments to directors."

Witness: It may happen to be so here, but there are a great many other things, and anything not here would be said to be an illegal expenditure.

The CHAIRMAN: That might be provided for. All that is wanted really is an exact account of the expenditure.

Mr. WEBSTER: That might be cured at once by saying that the annual accounts to be prepared by the company shall be made out in the form of the schedule annexed, "or as near thereto as may be." The Companies Act, 1848, merely says, "receipts and expenditure," so that whatever may be their receipts they would put them in, and whatever their expenditure they would put it in.

Witness: That would not do. For instance, under the head of "Meters," there is an item of a very large expenditure here. We have two classes of expenses on the meters—the storing and the repairing. Now, when companies do not charge meter-rent, it is right that the meters themselves, not being a part of the *corpus* of the gas-works, should be charged to revenue, as they are for the benefit of the consumers; but it would be contended, in all probability, that that ought to go to capital, and we do not know what would be the result. This form of accounts would be made to bear upon all legal questions connected with the expenditure of the gas company.

Cross-examined by Mr. WEBSTER: The schedule handed in is the one prescribed by the Secretary of State under the provisions of the Metropolis Gas Act. The Secretary of State has power to alter the terms of it from time to time. There are many items in common in all gas-works, but each company has items which are not in common with other companies. Take this as the nature of the items which are not in common—some companies charge for the use of their meters. I am only giving you one instance, by way of illustration. Other companies do not charge for them at all. The companies who do not charge for them very commonly charge in their accounts the new meters to revenue, while the other companies charge them to capital. Well, the result of that would be here that we should always have a quarrel upon the division between capital and revenue. The books would certainly show what sum was received, but the quarrel would be whether it was entered to the right account or not.

Mr. WEBSTER: I suppose the directors of the company, advised by Mr. Hawksley, would know which account to charge it to?

Witness: Yes; and the commissioners, advised by Mr. Barlow, would say it ought to be charged to another; and supposing the schedule shows what is to be charged, then it raises the presumption that nothing else can be charged.

The CHAIRMAN: I should think words could easily be framed to meet the case.

Mr. FORSYTH: The way would be simply this—to take the 38th section of the General Act, and put in one or two words which would guarantee the public that the distinct items would be specified.

Mr. WEBSTER: It is quite evident that the expenditure of all gas companies must be substantially the same in all cases. I would suggest that the clause should read thus—"The annual accounts to be prepared by the company in the terms of the 38th section of the Gas-Works Clauses Act, 1847, shall be made out according to the schedule annexed, or as near thereto as the circumstances of the company will permit." It is no interference with the business of the company, it will not prevent their putting other items in the account; but only prescribes that these, at all events, shall be put in.

Mr. FORSYTH said the proposition of his friend first enacted the schedule, and then made it of no effect. What a door for contest was open by the use of the words "as near thereto as the circumstances of the company will permit." Why tie the company to any stereotyped form of account? As to the form adopted under the Metropolis Gas Act, that might be varied by the Secretary of State at any time, according as experience pointed out that a change was necessary.

Sir JOHN DUCKWORTH: It does not seem to me that this clause, read as I suppose the Legislature intended it, would include a good deal of the receipts of the company. Suppose there were receipts for gas-fittings—there are in this case—these accounts would not include them.

Mr. FORSYTH: I think it would come within the terms "rents or funds."

Witness: The gas-fitting business is carried on and worked with the capital of the company, and, therefore, is an element in their receipts and expenditure.

After some further discussion,

The CHAIRMAN stated that the court were of opinion that the words "arranged under each separate head of receipt and expenditure respectively," if added to the clause, would meet the case.

The clause so amended was agreed to. The remaining clauses were also gone through and passed, and the chairman was directed to report the bill, as amended, to the House.

Miscellaneous News.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Shareholders of this Company was held at the Albion Hotel, Aldersgate Street, on Thursday, March 28—ERASMUS WILSON, Esq., F.R.S., in the chair.

Mr. MAGNUS OHREN (the secretary) read the advertisement convening the present meeting, also the minutes of the last meeting, which were confirmed.

The seal of the company was affixed to the register of shareholders, and the following report and statement of accounts were presented:—

The directors have to report a steady progress of the company's business during the half year, but are under the necessity of reiterating the drawbacks arising from the high price of coal, an increased scale of expenditure for wages and labour, and a depreciation of value of products.

The works and plant are in a state of efficiency, and the reports of Dr. Letheby and of the chemical officers appointed by the parishes included in the district are satisfactory as to the purity and illuminating power of the gas.

The directors going out of office by rotation are Mr. Erasmus Wilson and Mr. Henry Palfrey Stephenson, and these gentlemen, being eligible, offer themselves to the shareholders for re-election.

The auditor going out of office by rotation is Mr. John Gray, and this gentleman, being eligible, offers himself to the shareholders for re-election.

The balance-sheet for the half year to the 31st of December last, and appended to this report, shows the financial position of the company. The profits for the half year are £5330 4s. 7d., which, together with £96 9s. 5d., the unappropriated profit of the preceding half year, makes the available balance £5426 14s. Out of this sum the directors recommend the declaration of a dividend at the rate of 6 per cent. per annum on the preference capital, a dividend at the rate of 10 per cent. per annum on the original capital, and a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital, all free of income-tax; the sum of £150 to be carried to the contingent-fund, £50 to be written off the preliminary expenses, and £100 off parliamentary expenses; the balance of £72 1s. 1d. to be carried forward to the profit of the succeeding half year.

Profit and Loss, Half Year ending December 31, 1866.

Dr.				*Cr.*			
To Amount for coals carbonized		£9,059	4 7	By Gas-rental	£16,634 4 5		
Lime and oxide		161	15 0	Meter-rental	251 6 1		
Trade charges		870	6 10			£16,885	10 6
Rents, rates, and taxes		586	6 4	Coke made for sale	£2,821 6 11		
Directors and auditors fees		530	0 0	Breeze ditto	235 1 3		
Salaries and collectors commission		851	7 5	Tar ditto	551 11 1		
Wages		2,560	17 6	Sundries	252 14 2		
Interest on loans		583	19 4			3,860	13 11
Bad debts and allowances on collection		118	9 2	Sulphate of ammonia—net profit		201	6 4
Law charges		45	0 0				
Retort account		250	0 0				
		£15,617	6 2				
Balance		5,330	4 7				
		£20,947	10 9			£20,947	10 9

Balance-Sheet, December 31, 1866.

Dr.				*Cr.*			
To Proprietors for paid-up capital—				By Amount for plant, &c.		£135,831	14 1
5000 preference shares, at £10 per share		£50,000	0 0	Freehold land		8,837	14 5
5000 original shares, at £10 per share		50,000	0 0	Preliminary expenses		3,300	0 0
10,000 ordinary 7 per cent. shares, at £10 per share	£100,000 0 0			Parliamentary ditto		400	0 0
Less amount uncalled	65,088 0 0			Retort account		1,416	11 8
		34,912	0 0	Stock on hand		6,654	9 11
Loans		22,570	0 0	Amount due from sundry persons		3,277	3 3
Amount due to sundry persons		10,075	17 9	Invested in Consols from contingent-fund		164	5 5
Contingent-fund		1,425	6 10	Private rental and arrears		10,243	6 1
Profit unappropriated		96	9 5	Public rental and fitting arrears		2,196	18 3
Profit and loss		5,330	4 7	Balance at bankers		1,787	15 6
				Deposit at ditto		300	0 0
		£174,409	18 7			£174,409	18 7

Appropriation of Balance.

Balance brought forward from last account		£ 96	9 5	Dividend on preference share capital, at 6 per cent.	£1,500 0 0		
Ditto of profit and loss, Dec. 31, 1866		5,330	4 7	Ditto on original share capital, at 10 per cent.	2,500 0 0		
				Dividend on ordinary 7 per cent. capital	1,054 12 11		
						£5,054	12 11
				Preliminary expenses, to be written off	£ 50 0 0		
				Parliamentary ditto, ditto	100 0 0		
				Contingent-fund	150 0 0		
						300	0 0
				Balance to be carried to next account		72	1 1
		£5,426	14 0			£5,426	14 0

The CHAIRMAN moved—"That the report of the directors and the balance-sheet confirmed by the auditors be received, adopted, and entered on the minutes." In doing so, he said his remarks would necessarily be very brief, and this circumstance was in itself an indication of the satisfactory condition of the company. Their business during the last half year had been going on in the ordinary, steady, jog-trot way, and nothing beyond their usual routine duties had engaged the attention of the directors, except such questions as belonged to the political hemisphere, and the peculiar position of the country at the present time in reference to the relations of capital and labour. The directors always endeavoured to bear in mind that they were trustees—trustees

to the shareholders for the maintenance of the works of the company in the highest possible state of perfection, and fully competent for all the demands made upon their resources by the consumers. Another trust which the directors felt that they had laid upon them was, that they should be able to provide for the shareholders a fair and adequate return for the money they had invested in the undertaking. There had been, as was well known, a question raised of late whether gas property should pay 10 per cent. or be limited to 7 per cent.; but he believed that every man whose heart was in the right place would agree with him that the least return to the shareholders in works of this description ought to be 10 per cent. per annum. Unfortunately, as it appeared to him, they were not able to get so much as they deserved, and in that sense they resembled a great many other people in this world, and must content themselves, not with what they wished and had a right to expect, but what they could get. The third trust laid upon the directors, and which they always endeavoured to keep in mind, was perhaps a more important one than either of the former he had mentioned, and that was the trust to supply the consumers in their district with the best possible article they could manufacture, and at the lowest price they could afford, consistently with the maintenance of those profits to the proprietors which he had referred to, as being a vital consideration in an association of this kind. He believed they had hitherto been very successful in their endeavours to discharge their duty in these particulars. They had the advantage of the skill and ability of one of the greatest practical chemists of the day—Dr. Letheby—who went down to the works whenever he chose, without any prior knowledge on the part of the officers of the company, and tested the gas, so as to be able to satisfy the directors that the quality was all that could be desired; and it was a most gratifying circumstance that on all occasions Dr. Letheby's report had been of a favourable character. Then, as he need hardly inform the meeting, the directors had, ever since the commencement of the undertaking, been gradually reducing the price of gas, until at last it had arrived at a point which, for an extra-urban company, was exceedingly small. They ought never to forget that they were not a metropolitan company, as far as their conveniences for the distribution of gas were concerned. They possessed many miles of mains which were unproductive, or from which only a few lights were supplied. But though these mains were unprofitable, the company were under a bond to the district which they supplied to keep the roads and lanes sufficiently lighted, so as to prevent accidents at night, and to contribute to the general protection of person and property. One would almost fancy, nevertheless, that the light furnished by the company was offensive to the fast young men of the district, who went home late in the evening, and that they desired to have the place in darkness, or else it would seem that these gentlemen could find no more congenial amusement than doing mischief to the property of others. This company, however, were somewhat in the position of the frogs in the fable, for though it might be excellent fun to these parties to throw stones through the panes of glass in the public lamps, it was anything but fun to those who had to pay for repairing the damage. This was an item of expense not calculated upon in Acts of Parliament, nor regarded by the theoretical contrivers of the proper dividends for shareholders, but which gas companies were not unfrequently called upon to meet. There were other matters besides which often contributed to increase their difficulties and swell their expenditure; such, for example, as when the railways were snowed up, and the coals required at the works were compelled to remain far off at the wharf. Such considerations as these never entered the heads of theoretical legislators who ventured to think themselves qualified to lay down laws for the government of such undertakings, and therefore he thought the shareholders would agree with him in regarding those who, ignorant or regardless of the circumstances in which such works were conducted, would pare off 2 or 3 per cent. of their dividends, as though it were a matter of little importance, in the light of their natural enemies. After some further observations the chairman concluded by moving the resolution.

Mr. H. P. Stephenson (deputy-chairman) seconded the same. He said the directors at the latter end of last year found that the Crystal Palace District Company was, with other suburban companies, included in the notices given by the Board of Trade of a proposed bill for regulating the supply of gas to the metropolis. Immediately upon the discovery, they presented a very strong memorial to that department of the Government, on the subject, and he was now very happy to be able to inform the meeting, because he felt it to be a question vitally affecting their interests, that in the Metropolis Gas Bill, just printed, this company was entirely excluded, and they remained now as it was settled by the Act of 1860 they should remain, altogether free from those arrangements to which the thirteen London companies were then subject, and the further arrangements to which they would be subject if the bill introduced by the Government this session became law. For, though the arrangements of the Act of 1860 were sufficiently onerous, it was impossible to say what might be the position of the metropolitan gas companies in such a case in the future. He congratulated the shareholders of this company, therefore, that they were excluded from the operation of this prospective legislation. After giving a brief analysis of the bill, the deputy-chairman concluded by expressing an opinion that it would be very difficult to bring such a measure into practical working order. He earnestly hoped, in the interests of all parties, that a settlement of the metropolis gas question might be effected this session, but he had no hope that any satisfactory solution would be arrived at on the basis of the Government bill.

Mr. Hadland said the directors of the metropolitan gas companies had determined to oppose the Government bill, and, if possible, to defeat it upon the second reading. It was very desirable that every gas proprietor throughout the kingdom should use his influence with members of the House of Commons, so as to get them to vote against the measure, for if such a scheme were carried into effect in the metropolitan district, they might depend upon it that legislation of the same kind would be attempted all over the country.

The motion was then put and carried unanimously.

Mr. George Hill moved—"That a dividend at the rate of 6 per cent. per annum on the preference capital, a dividend at the rate of 10 per cent. per annum on the original capital, and a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital, all free of income-tax, be now declared, and be made payable forthwith."

Mr. Froggatt seconded the motion, which was agreed to.

On the motion of Mr. Hyam, seconded by Mr. John Gray, the chairman, whose term of office had expired, was re-elected a director of the company.

The Chairman acknowledged his obligations to the meeting for the compliment implied in his reappointment, and proposed the re-election of Mr. H. P. Stephenson, whose past services he spoke of in highly eulogistic terms.

Mr. Crossley seconded the motion, which was at once adopted.

On the motion of Mr. Aird, seconded by Mr. Williams, the meeting re-elected Mr. John Gray an auditor of the company.

Rev. G. Pocock moved, and Mr. Crossley seconded, a vote of thanks to the directors, which was very cordially adopted, and briefly responded to by the chairman.

Mr. Hadland moved, and Mr. Hyam seconded, a vote of thanks to the auditors and officers of the company for the efficient discharge of their duties, which was unanimously adopted.

Mr. Purvis said it was very gratifying to him and his fellow-auditor to find that their services were appreciated, and on behalf of the officers of the company he thanked the meeting for the vote of confidence just passed. If anything could prompt them to fresh exertions in the discharge of their duties it was the expression of satisfaction with which they were always greeted at these meetings of the proprietors. The auditors being shareholders in the company, felt a lively interest in looking after its welfare, and as long as they enjoyed the confidence of their brother shareholders they would spare no effort to deserve their good opinion.

On the motion of the Rev. G. Pocock, seconded by Mr. Froggatt, thanks were voted to the chair, and the proceedings then terminated.

METROPOLIS GAS SUPPLY.

Metropolitan Board of Works—Friday, March 30.

At the Meeting of the Board this day—Sir John Thwaites in the chair,

The Solicitor (Mr. Smith) brought up a report upon the bill introduced by Government into the House of Commons for amending the Metropolis Gas Act, 1860, a copy of which bill had been already sent to every member of the board. After giving a brief analysis of the principal provisions of the bill, the report went on to say that the principle and scheme of the bill, as well as the machinery by which its objects were to be carried out, would require great care and attention. As far as the Metropolitan Board were concerned, their powers under the bill appeared to be very limited, except with regard to the purchase of any of the works of the gas companies, and the mode of meeting the expenses which such purchase would occasion. The purchasing clauses, however, were far too general, and it was difficult to see how clauses 49 and 50 could be carried into effect. These two clauses seemed to the solicitor to require very careful consideration. He recommended that the bill should be carefully scrutinized by a parliamentary draughtsman, to see that it was framed as it ought to be.

The Chairman thought it would be well to print the solicitor's analysis of the bill for the information of the members.

Mr. H. L. Taylor expressed his opinion, from hearing the analysis read, that the system proposed to be inaugurated by the bill was a great improvement upon the old system.

The Chairman said the subject would require great attention at the hands of the board. He apprehended that they would be prepared to support the bill before a committee of the House of Commons, and seek there to get proper provisions introduced, as there were many questions involved in it which affected parties represented by the board. It seemed to him that the control given to the board was exceedingly limited.

Mr. H. L. Taylor said, as he understood the matter from the reading of the analysis, there was no provision in the bill for enforcing penalties upon the gas companies in case of neglect.

The Solicitor said there were none.

The Chairman said the penalties upon the companies were in another form. In the event of failure they would not be allowed the same amount of dividend. Probably this would prove more effectual than anything else.

Mr. H. L. Taylor thought it was an admirable substitution for the existing system. To punish them in such a way as proposed would be far more effectual than by enacting penalties which were never enforced. He understood the maximum price for 14-candle gas was to be 3s. 6d., with 3d. per 1000 cubic feet for every candle additional in the illuminating power. He hoped, however, that the board would go in for 14-candle gas at 3s. per 1000.

Mr. Harris suggested to the honourable member that it would be better to go in for half a crown per 1000 at once.

Mr. Brushfield said there was nothing like asking enough.

The Chairman said perhaps it might be convenient to refer the bill to the Gas Committee, who had paid great attention to the collection of facts, and moved a resolution authorizing the solicitor to appear by counsel in support of the bill.

Mr. Phillips moved a resolution to that effect.

Mr. Elt said his attention had been directed to a provision in the second schedule, which was said by competent persons to be very objectionable. He did not himself understand the nature of the objection, but he was told that the words "with or without a perforated disc," in the description of the test burner ought to be omitted. He hoped the attention of the committee would be directed to the point.

The motion was put and carried, and it was resolved that the solicitor's report be printed and circulated among the members.

READING TOWN COUNCIL AND LOCAL BOARD.

At a Meeting of the Reading Town Council and Local Board of Health, held on Thursday, the 21st ult.—the Mayor (H. J. Simonds, Esq.) in the chair—the following report of the Public Lamps Committee was read:—

The committee beg to report that in accordance with the resolution adopted by the board on the 7th of February last, they have considered the course which it would be desirable to adopt in regard to the account of the Reading Gas Company for the supply of gas to the public lamps for the half year ending December, 1866, and in reference to the future lighting of the public lamps.

As regards the account, the committee do not deem it desirable to advise the board to resist its payment, as they believe that the board can more advance the interests of the public by devoting a careful attention to the future arrangements for the supply of gas by the company than by seeking to reduce the company's past claim against the board, or to enforce penalties because of the defects in the illuminating power or purity of the gas supplied by the company. The committee therefore recommend that the board do pay the account of the gas company as delivered, amounting to £582 0s. 3d., and that an order be signed on the treasurer for payment thereof to the company from the general district rate account.

With respect to the course to be adopted by the board in the future, the committee are of opinion that steps should be taken by the board effectually to secure two results—1st, That the gas to be supplied by the company be maintained at a standard of illuminating power and purity not inferior to that prescribed by the company's Act of Parliament; and 2nd, That the board be not rendered liable by any act of the company, whether by alterations in the pressure in the company's mains or otherwise, to pay for more gas than the board may require. The committee hope that it is in the power of the board to adopt effectual measures to secure these results.

In a letter received by the clerk from Mr. Samuel Hughes, the engineer, on the 22nd of February, that gentleman writes: "I am convinced from experiments in other towns that 3 feet an hour consumed in steatite burners at a low pressure give a most ample light, quite equal to 5 feet an hour through the old-fashioned small iron burners." With this statement before the committee, they cannot but feel that the board will be acting with liberality towards the gas company if they limit the consumption of gas by the public lamps to the maximum of 3½ feet of gas per lamp per hour, it being clear that if the illuminating power of the gas be maintained at a satisfactory standard, an average consumption of that quantity of gas is more than ample to produce a proper and satisfactory light.

In reference to this point and the legal power of the board to give practical effect thereto, the committee beg to draw the attention of the board to the 79th section of the company's Act by which it is enacted, as follows:—"The company shall at all

times well and effectually supply with gas all and every of the public lamps in streets within the borough of Reading, which the local board from time to time may require to be lighted, and shall, according to the terms and provisions of this Act, supply to the said lamps, at a rate not exceeding the rate by this Act limited for gas supplied to public lamps, so much gas as the local board may require."

It would seem, on a fair interpretation of this enactment, that it empowers the board to prescribe the quantity of gas which they may require to be supplied to the public lamps, and that having made such a requirement the board would only be liable to pay for such quantity as they may require to be consumed. The committee therefore recommend that the clerk to the board be instructed to give notice to the gas company that the board require them, from and after the 31st of March instant, to supply to all and every the public lamps within this borough, which the board from time to time may require to be lighted, the following quantity of gas—that is to say, so much gas that there may be consumed at each lamp during each night on which it may be lighted an average quantity of not less than 3 cubic feet of gas, nor more than 3½ cubic feet of gas per hour; and that the board will not pay for any gas supplied to the public lamps in excess of the quantity thus required by the board.

The committee also recommend that the clerk do inform the company that the board will require a *pro ratâ* reduction to be made in the price to be paid by the board for the gas supplied to the public lamps from the 1st of January last, and to be supplied hereafter in proportion to the greatest reduction made to any other consumer, having regard to the relative standard of charges prescribed by the company's Act.

The committee have also considered what course should be adopted to ensure a compliance with the provisions of the company's Act in regard to the illuminating power and purity of the gas supplied by the company, and the committee recommend that for this purpose the mayor be empowered to consult such competent professional man as he may deem necessary, and to order such measures to be taken as the mayor may from time to time deem expedient.

Mr. PALMER said he had great pleasure in proposing the adoption of the report.

Mr. A. SIMONDS seconded it.

Mr. TAYLOR said that gentlemen around that table pretty well knew his connexion with the gas company, and he might say he believed that any communication which the board should make to the gas company would be received in an amicable and courteous spirit. They would endeavour to meet the wishes of the board as far as it was consistent with the interests of the shareholders of the company. The imputations in the report with regard to the illuminating force of the gas were not justified by any circumstances that had come to his knowledge, and he could have wished that they had been omitted. If gentlemen had the time, and would take the trouble to make inquiries, or if the Public Lights Committee had instructed their officer to make his experiments at regular and stated times, and he had given the result of what gas was supplied, there would not have been the slightest ground for such imputations. On only two occasions during six months was it found that the gas was slightly under the requisite standard. No mention was made of the number of times the gas was above the standard, and yet an imputation was made upon the gas company, and it was insinuated to the inhabitants unjustly that the company had been supplying gas at a less standard than that which they were required to do. That report would go before the town, and he could not but think that it was unjust to the company. However, they would be ready and willing to meet the board in a fair and courteous spirit.

Mr. BLACKWELL next addressed the board, but he was almost inaudible to the reporters. He was understood to say that he did not see why the gas company should be called upon because an extra quantity of gas had been consumed, as it was in the power of the consumers to regulate the gas. Therefore, it was not fair to charge the company with having supplied a greater quantity than was required. He was in a position to know, not from mere guess-work, but from facts, that the illuminating force of the gas had been exceedingly good, and instead of it being 12 candles, it had averaged 13 and 14 candles. It might not be known, but such was the case, that 13-candle gas in Reading was equal to 14 in London. It had been ruled that where a gas company was limited to a certain amount of illuminating power, they were entitled to use the best instrument for that power, but the Reading Gas Company was confined to the old Birmingham system, which destroyed about one-tenth of the illuminating power of the gas. The report stated that the mayor should be instructed to employ people to test the gas, but that was already provided for in the Act of Parliament, by which it was enacted that competent persons should be appointed by the justices to test the gas, and if it was found below the proper standard, or it was not of the requisite purity, the gas company was to be summoned, and if they could not show that it occurred through circumstances over which they had no control, they would be fined for it. But it was not competent that one person should go and employ whom he thought proper to test the gas. They could have properly qualified men, not merely gas-fitters, and surely that was sufficient and the most satisfactory. He thought it was unfair and unjust to publish such reports as had been presented to the board, in order to create discontent in the minds of the public of Reading. Then as regarded the reduction in the price of gas. It was provided in the Act of Parliament that the public lamps should be supplied at 3s. 7d. per 1000 feet, which was 25 per cent. lower than was charged to private consumers. There was nothing whatever in the Act to prevent the company charging as low as they could to the private consumer, and he was of opinion that the course they had pursued in this matter was the right one. It was, however, a matter of perfect indifference to the gas company: it was a question entirely between the gas consumers and the ratepayers, because, if the public lamps were to be paid for at a lower rate, the private consumers would have to pay more. It was, therefore, entirely a question for the ratepayers on the one hand, and for the private consumers on the other hand. Whatever course was adopted, it would not make the slightest difference to the shareholders of the gas company. He did not think there was any necessity for the board to have acted in the manner it had done, and such a report as was presented at the last meeting, and the remarks made in reference to it, were entirely uncalled for, and if the proper course had been taken by the committee, a much more satisfactory conclusion would have been arrived at.

Mr. A. SIMONDS: I believe Mr. Blackwell is a director of the gas company.

Mr. BLACKWELL: I am the deputy-chairman.

The MAYOR said if the examining of the gas was a matter which was previously brought before the justices, the company would know when the gas would be tested. They wanted to test it whenever they liked, and that was the reason the clause was inserted about himself.

Mr. H. B. BLANDY said, as a director of the gas company, he could assure the board that they had no other wish than to have the gas tested, and they had no desire to know when the testing was to take place. The company was actuated by the most honest feelings in the matter, although some gentlemen acted as if such were not the case. The report, as it appeared to him, was founded in something like this spirit: that when people could not see their writing quite so plainly, tests were made of the gas. Now, it was possible that the gas had been now and then lower than usual, and it was upon such standards that the averages had been made.

The MAYOR said that the average was not contemplated by the Act; the minimum was the essence of the agreement, and it was implied that the gas should be 2 candles above the minimum, which would be 14 candles.

Mr. COOPER: Barring circumstances.

The MAYOR: I do not like people who are labouring "under circumstances over which they have no control."

Mr. TAYLOR said the gas company had no wish to evade any clause in the Act of Parliament. What they desired was to have a fair and honest testing of the gas from day to day, and a just representation of the result made to the public.

The TOWN-CLERK said he felt it his duty to call their attention to this matter, for the Public Gaslights Committee had had a serious duty to perform, and had bestowed much time upon the subject. Yet, notwithstanding that, the chairman and deputy-chairman of the gas company were availing themselves of seats at that board to send forth their remarks to the public to gloss the matter over, and to detract from the merits of the report. That was contrary to the Act of Parliament; it was a violation of the spirit of it, and he was not certain if it was not a violation of the language of it.

The MAYOR said he was quite certain that it was penal for them to do so if any one were to move a resolution to that effect.

The TOWN-CLERK said those around that table were representatives of the public and not the gas company, and yet three directors had thought it necessary to use their position as members of that board to make remarks in order to vitiate the report of the committee before it went forth to the public.

Mr. TAYLOR remarked that as a matter of law, perhaps, they had not acted right, but as a matter of courtesy it was a very different thing. It was in consequence of an allusion made to his position as chairman of the gas company that he made any remarks at all upon the matter, for he carefully refrained from going into details when he commented in the first place upon the report.

Mr. A. SYMONDS said he only called the attention of the members to the fact that Mr. Taylor was chairman of the gas company in order that they should understand who was advocating the cause of the gas company, at such great length and with such earnestness.

Mr. PALMER said when he moved the adoption of the report he did not make any remarks upon it, because he thought the report itself was strong enough. He did not think it was too strong, but he did not wish to add to its force, and another reason he did not comment upon it was because he was not thoroughly master of the subject. But as a private consumer of gas at his own house, and as a large consumer in business, he could only say that if the gas was exceedingly good one night, middling the next night, and very bad the third night, it did not answer the purpose of the consumers, and, as a gas consumer, he had a right to test his gas when it was very bad. He did not thank them for supplying him with good gas for two or three nights, and on a fourth for it to be of a much more inferior quality. When the gas-regulator was fixed to work at a certain scale, he did complain if any extra quantity of gas was forced through, and his bill was in consequence very much in excess.

The MAYOR: Those are circumstances over which they have no control.

Mr. PALMER: Let them apply the same principle to every man around that table. If the goods, for instance, that he supplied to-day were first-rate, the next day second-rate, and the next day third-rate, who would say that he was conducting his business properly? They should deal in the same manner with a public company, and they had a right to expect good and efficient management, and a proper article regularly supplied to them.

Mr. TAYLOR (addressing the mayor): Will you allow me to make a remark?

The TOWN-CLERK: You have already contradicted two statements in the report. (Cries of "Order.")

Mr. COOPER: You have no right to interfere. He is addressing the mayor as a gentleman.

The TOWN-CLERK: I do not care for that. (Order.)

Mr. COOPER: You have no right to interrupt him.

Mr. CHURCH: Sit down, sir. He is addressing the mayor, and you have no business to interfere.

The TOWN-CLERK: You are a director also, Mr. Church.

Mr. CHURCH: That is no business of yours, sir. You are only a paid servant, and should attend to your own duty.

The TOWN-CLERK: Look at the Act of Parliament.

Mr. CHURCH (looking at the clause): I see, sir; I see. But I don't see that you are to interrupt him, sir.

The MAYOR: Gentlemen, you are out of order. Allow Mr. Taylor to proceed.

Mr. TAYLOR: I am prepared to prove that Mr. Palmer is labouring under a mistake, for the pressure of the gas company is precisely the same night after night, The pressure has been most regular through the whole of the winter, and an extra quantity of gas cannot have been forced through the pipes, as mentioned by Mr. Palmer. I can prove that by the apparatus at the gas-works, by which can be seen the pressure for every day and night.

Mr. ANDREWES: Can you explain how it is the gas bills are so much in excess?

Mr. BLACKWELL: I can answer that question.

The MAYOR: No; Mr. Taylor is the representative of the gas company, and one is sufficient.

Mr. BLACKWELL: A question was asked, and I was going to answer it; but if the mayor tells me I am out of order, I will sit down, but I would not do so for Mr. Rogers.

The report was then adopted.

A COURSE OF LECTURES ON COAL GAS.

By Dr. FRANKLAND, F.R.S., &c., &c.

[*Delivered at the Royal Institution of Great Britain.*]

THIRD LECTURE.—THURSDAY, MARCH 14.

Photometry, or the process of estimating the value of light from any source of luminosity, depends as we have seen upon a comparison of one source of light taken as the standard, with another which we may call the test-light, or light to be tested. If we find at what distance a surface placed perpendicularly to the direction of the light will be equally illuminated by these two lights, if we then measure the distance between this surface and each of the two lights, square those two measured distances, and divide the square of the distance of the standard light into the square of the distance of the light to be tested, the quotient will be the amount of the light of the latter expressed in terms of the former. Thus, if we find the distance of the standard light from the surface which it illuminates to be 2 feet, and that of the light to be tested 4 feet, we then square those two numbers—$4 \times 4 = 16$ and $2 \times 2 = 4$—and divide the square of the distance of the

standard light into the square of the distance of the light to be tested, by which we get the quotient 4, which tells us that the light tested is 4 times as strong as the standard.

This equality in illumination of a given surface may be ascertained by two distinct processes—either by comparing the depth of the shadow cast by some opaque object upon the surface, the lights being so arranged that the two shadows shall fall as nearly as possible side by side; or, secondly, by the moving of a translucent screen between the two lights, so as to ascertain the point at which their luminosity is equal, one light shining upon one side of the screen and the other on the opposite side. This latter mode is the one almost universally adopted for ascertaining the luminosity of gas-flames, and you have before you, on the table, a complete set of apparatus such as is now generally employed for this particular purpose. This beautiful series of instruments, which has been brought to the greatest perfection by Mr. Sugg, the gas apparatus manufacturer, to whom I am indebted for the loan of it on the present occasion, consists in the first place of a meter for the accurate measurement of the gas to be consumed; secondly, of a governor to which the gas passes from the meter, and which, during the process of testing, keeps the pressure of the gas uniform, so that the consumption at the burner remains constant throughout the experiment. Then we have a delicate balance for weighing the standard candle or candles with which the gas flame is to be compared; for although these candles burn tolerably uniformly at the rate of about 120 grains of sperm per hour, they are subject to fluctuation, the wick sometimes getting a little too long or curving over too sharply, so that no result which is worthy of strict reliance can be obtained, unless we take the weight of the candles previous to lighting them and again at the close of the experiment. If it be found that the consumption of sperm has been greater or less than 120 grains per hour, the necessary correction must be made. The meter contains within itself a little clock, by which the rate of the consumption of the gas is seen at a glance. [The working of the meter was exhibited by projecting an image of the dial upon a screen by means of the electric light.]

Now, this mode of ascertaining the relative value of two sources of light may be varied by different contrivances to replace the translucent disc. Mr. Wheatstone very ingeniously revolves a little mirror travelling upon a block of wood between the two lights. An elliptical or circular image of the two lights is thus obtained in the mirror, and the latter is then moved into such a position that the two circles of light are equally brilliant. But the plan of Professor Bunsen—viz., the translucent disc—is the one most commonly employed by gas engineers for the purpose of practically testing gas.

Having thus made ourselves acquainted with the mode of testing the light of a gas-flame, we may return to the consideration of the combustion of gas. We have learned that the degree of luminosity in a gas-flame depends, first, upon the amount and quality of the dense hydrocarbons in the shell of combustion at any given moment; and, secondly, on the temperature to which these vapours are exposed. These conditions for maximum light are secured in different degrees by the various kinds of burners in use. I have here some specimens of the different kinds of gas-burners. The first I call your attention to is the bat's-wing burner, which consists of a nearly globular piece of steel or steatite, in the top of which a slit is cut. The next is an Argand burner of peculiar construction, known as the Leslie burner, which consists of a number of very minute steel tubes which meet together at a slight angle, producing a continuous circle of flame. This burner is always furnished with a glass chimney, to give the requisite amount of draught so as to produce the desired result. Here, again, is another kind of Argand burner, the invention of Mr. Sugg. It is a steatite burner, and the aperture for the admission of air into the interior of the flame is adapted to the quality and to the necessary quantity of gas consumed. This is the burner which engineers say gives the largest amount of light producible from any Argand burner ever constructed in this country. There is a burner used in France called the Bengel burner, which gives a slightly increased advantage over this one; but the burner of Mr. Sugg so far increases the light, that a sample of gas which, consumed in an ordinary Argand, would give the light of 12 candles, if consumed from this burner, gives the light of 13½ candles. The gas companies have not been slow in taking advantage of this peculiarly good burner for measuring the luminosity of their gas, so that, while still keeping within the provisions of the Act of Parliament as to the description of burner to be employed in testing, they are enabled to supply gas of 1½ candle lower illuminating power than it would possess if tested by the original form of the Argand burner. This burner of Mr. Sugg is a most excellent arrangement, for, by the regulation of the stream of air both inside and outside the flame, the larger amount of light just mentioned is produced without any greater consumption of gas.

The primitive form of gas-burner employed was a single-jet burner, of which here is a specimen. This jet was sometimes made to represent a candle burning; at other times two or more of these jets were made to spring out of a single stem. Now, this is the very worst mode of burning gas that could possibly be devised. The gas rushes uninterruptedly into the air from the opening—a condition peculiarly unfavourable for getting the maximum amount of light out of it. A gentleman in Manchester, whose name, I am almost ashamed to say, I do not remember, happened to try some experiments with these single jets of gas, and, burning two at the same time, partly by accident and partly by design, he brought the two together. He was astonished at the great increase of light which he obtained by bringing these two jets into juxtaposition, so as to form a flat flame in the manner now exhibited. This constitutes what we now call the fishtail burner, and it is the most common form in use for the consumption of all kinds of gas. In the following table you have a comparison of the illuminating power obtained from gas-jets when burning separately and when in conjunction:—

Comparative Illuminating Power of Separate and Combined Jets.

Size of Jet.	Relative Value per Cubic Foot of Gas. Separate.	Combined.
·067 inch.	100	164
·083 ,,	100	190
·100 ,,	100	184

To understand the merits and defects of the different burners which we have here before us, and even to know how to use them properly, it is necessary to examine closely the influences which affect the two great conditions of illumination already mentioned—viz., first, the amount and quality of the dense hydrocarbon vapours in the shell of combustion at any given moment; and, secondly, the temperature to which these vapours are at the same time exposed. To this part of the subject I want to direct your attention for a moment. Now, first, the amount, and probably the quality of the heavy hydrocarbon vapours to which we have attributed the luminosity of a gas-flame—the rate of consumption of the gas, we will assume, remaining constant in the experiment—depends—

1. Upon the access of atmospheric air to the flame.
2. Upon the velocity with which these hydrocarbon vapours are driven through the flame; and
3. Upon the pressure of the atmosphere as measured by the barometer.

The great influence of the first of these conditions will be apparent when we consider the amount of light which is lost by the admixture of air with gas previous to combustion. This has been determined by a set of experiments, the results of which are contained in the following table:—

Diminution of Light by Admixture of Air with Coal Gas.

Pure gas	100
Gas with 1 per cent. of air.	94
,, 2 ,,	89
,, 3 ,,	82
,, 4 ,,	74
,, 5 ,,	67
,, 6 ,,	56
,, 7 ,,	47
,, 8 ,,	42
,, 9 ,,	36
,, 10 ,,	33
,, 15 ,,	20
,, 20 ,,	7
,, 30 ,,	2
,, 40 ,,	0

The gas supplied to this institution is cannel gas, and therefore, in the experiment I am now going to show you, we shall not get results quite in accordance with this table, which records the results of experiments with coal gas. We will ascertain, first, the loss of light due to an admixture of 10 per cent. of atmospheric air. I have here in a gasholder an admixture of cannel gas with 10 per cent. of atmospheric air, and you will observe the light of the flame obtained from it is considerably less than that from pure gas. Let us now try it with an admixture of 40 per cent. [Experiment tried—an almost lightless flame being the result.] The luminosity in this last case would have entirely disappeared if we had employed common coal gas. In fact, the admixture of air as affecting the luminosity of a flame has been made a means of testing gas, because the richer the gas the more air it will require to get rid of the luminosity. Professor Erdmann, of Leipzic, has contrived a burner through which known quantities of atmospheric air are admitted, and mixed with the gas until the luminosity of the latter is entirely destroyed; the amount of air required for this purpose indicating the illuminating power of the gas upon which the operation is performed.

Now, this reduction of the illuminating power of gas by the admission of atmospheric air is not due exclusively to the oxygen contained in the air. If cannel gas, containing 8 per cent. of pure oxygen, be burned, the light is somewhat diminished; still there is a very brilliant luminous flame, not much inferior to the flame of pure gas. And you will observe that a gas which contains 8 per cent. of pure oxygen has as much oxygen in it as though it had been mixed with 40 per cent. of atmospheric air, as in the experiment we just now made, because atmospheric air contains nitrogen to the extent of four times its volume of oxygen. Nevertheless, if we take the ratio of the oxygen to the cannel gas in the experiment, this ratio would be reached by the admission of 30 per cent. of atmospheric air into coal gas; and 30 per cent., you will see by the table, destroys all the luminosity with the exception of 2 per cent. So that, obviously, this destruction of light is not due solely or even chiefly to the admission of oxygen. It is due in a great measure to the cooling effect of the nitrogen, which is the other constituent of atmospheric air, as well as to the destruction of the luminous hydrocarbon vapours by the action of atmospheric oxygen. Now this admixture must, of course, occur in all flames to some extent, otherwise combustion could not go on, and we should be deprived of the real source of light—viz., heat. We cannot get the light from these flames without a certain sacrifice to the atmospheric oxygen, which enters at every part of the flame, and causes the gas to burn. But this access of atmospheric air to the flame should be as small as possible, consistent with the perfect combustion of the different ingredients contained in the gas. The different burners employed present very different amounts of flame-surface to the atmosphere; and again, the pressure of the gas, and the velocity of the current of the air, and of the flame also exert a very great influence. Thus, if the gas be turned on to this fishtail burner to a certain extent, we get a very luminous flame; but if, by turning the tap still further, I increase the issue of gas from the burner, instead of getting more light I get less, because the gas now rushes out of the burner with extreme velocity, and, in thus rushing out, mixes itself up with a large quantity of air, which, penetrating into the flame on all sides, attacks the luminiferous hydrocarbons, and also reduces the temperature of combustion.

The second condition to which I have alluded—viz., the velocity with which the luminous hydrocarbons are driven through the flame—must, it is perfectly obvious, constitute an essential feature in the luminosity of the flame; that is, for maximum light, these luminous hydrocarbons should remain sojourning in the flame for the longest possible time. The quicker they get through the flame the sooner they cease to be luminous vapour, and consequently at any given time there must be a less amount of this light-giving vapour in the gas-flame. We see this very clearly in the Leslie burner, the great merit of which is, that it has glasses adapted to the various sizes of burners, so that the gas is burned to the greatest advantage. By increasing the height of the chimney, and consequently the draught to the flame, we get less light with the same consumption of gas; but if we turn on more gas, we then get the consumption for which the larger chimney is adapted. Now, if I take a perforated plate of mica or any other material which will enable me to stop the draught in the chimney, you see at once the effect—a dense smoky flame is produced; but when I turn down the gas considerably I get almost the original amount of light out of the smaller quantity of gas, because I have reduced the rapidity with which the luminous particles get out of the reach of ignition, and get destroyed as sources of light.

Such are the modes of reducing the velocity in Argand burners, and these were the only sorts of burners which could be with advantage treated in this way, until recently. The fishtail burner itself, however, owes its advantage to the same condition which I have now explained with regard to the Argand burner. When two jets of gas rush freely into the air, they get mixed with a considerable body of that air, and their luminosity is consequently decreased; but when they impinge upon each other, as in the fishtail flame, their velocity is retarded in the clash of the gaseous molecules, and the luminosity of the flame produced is thereby greatly increased.

This principle of retardation of velocity has just been most successfully applied to fishtail burners by Mr. Scholl, of Berwick Street, Oxford Street. Here is a common fishtail flame burning in the ordinary way. The two jets of gas are impinging upon each other, producing a flat flame. But now, in place of letting the two jets strike upon each other, I let them impinge

upon a little plate of platinum, by which the velocity of the gas is still further diminished, so that the hydrocarbons linger for a longer time before they reach the upper edge of the flame, where they are consumed at the expense of the atmospheric oxygen, and cease to be illuminating agents. Mr. Scholl's invention consists in inserting such a little piece of platinum plate between the two jets of a fishtail burner; the platinum is supported by a copper ferrule, which slips over the top of the fishtail burner, and you shall now see the effect of this "Platinum Perfecter" as it is termed. You observe that the increase of light is very marked. The augmentation is not the same in every case. I have found it to vary from about 21 per cent. to 71½ per cent increase. Dr. Letheby, who has also experimented upon it, ascribes 63 per cent. as the increase in luminosity in a fishtail burner when the "Perfecter" is employed; and he also finds that the consumption of gas is, as might be anticipated, slightly diminished.

It is also remarkable that the richer the gas the greater is the comparative augmentation in the light of the flame. In order to show this gain in the light of a rich gas, I will pass the gas we are now burning through a naphthalizer, in which it will become impregnated with hydrocarbon vapours, so that it will have an illuminating power of from 26 to 30 candles for a consumption of 5 cubic feet per hour, whereas, in its former condition, it produced a light of only about 20 candles for the same consumption. I now place upon the burner one of these perfecters, and you observe at once the great increase in the light obtained. The same invention may also be applied to the bat's-wing burner, and with almost an equally advantageous effect. It has been attempted to apply it to the Argand flame, but, I think, there is not much chance of profit in that direction. The burner which derives the greatest advantage from it is the fishtail, and for this reason, that the two jets, instead of impinging against each other, impinge upon this piece of platinum and have their velocity checked, thus causing the ignited and luminous vapours to move upwards with less velocity and to remain longer in the flame before they reach its apex and cease to be luminous agents.

A third condition has been mentioned as exercising a marked influence upon the light of a flame, that is, the density or pressure of the atmosphere as measured by the baremeter. This condition was looked upon as very remarkable at the time it was first noticed, but it ceases to be so when we call to mind the experiment with arsenic in our first lecture. You will remember that the mere expansion of the arsenical vapour, by making the combustion take place in rarefied oxygen, reduces the light almost to *nil*. A perfectly similar effect is produced upon a gas-flame when the atmospheric pressure is reduced, whilst, on the other hand, the luminosity is increased by augmenting the pressure. Of these facts we may soon convince ourselves. I have here a receiver which fits upon an air-pump plate, and by this means we can reduce the pressure upon the gas-flame placed beneath it. [Experiment performed.] Allow me to refer you to the results of a series of experiments made with coal gas in this way:—

Pressure of Air in Inches of Mercury.	Observed Illuminating Power.
30·2	100·0
28·2	91·4
26·2	80·6
24·2	73·0
22·2	61·4
20·2	47·8
18·2	37·4
16·2	29·4
14·2	19·8
12·2	12·5
10·2	3·6

Now this diminution of luminosity follows a fixed and definite law, which may be thus expressed—the decrease in illuminating power is directly proportional to the decrease of atmospheric pressure. Of 100 units of light emitted by a gas-flame burning in air, 5·1 units are extinguished by each reduction of 1 mercurial inch of atmospheric pressure. On the other hand, if a lightless flame be made to burn under augmented pressure, it becomes luminous. Here is the flame of a spirit-lamp, which I place under the receiver of a condensing air-pump, where I will expose it to a pressure of three atmospheres, and you observe that the previously lightless flame now glows with considerable luminosity. [Experiment performed.] The causes which produce this difference in the luminosity under increased or diminished pressure we will investigate in the next lecture.

Fourth Lecture.—Saturday, March 16.

In the preceding lectures of this course we have investigated the conditions on which the luminosity of a gas-flame depends, and as the result of our experiments we arrived at the conclusion that this luminosity depends upon two essential conditions, viz.—

1. Upon the amount and also the quality of the dense hydrocarbon vapours in the shell of combustion of the flame; and
2. Upon the temperature to which those dense hydrocarbon vapours are heated.

In the last lecture we proceeded to investigate the circumstances surrounding a gas-flame which affect the first of these conditions, and we found that the amount and quality of these hydrocarbons depend upon three circumstances, viz.—

1. The access of the external atmospheric air to the flame.
2. The velocity with which the dense vaporous hydrocarbons are propelled through the flame, or pass upwards; and
3. The pressure of the atmosphere at the time the flame is burning.

At the conclusion of the lecture we were engaged in the investigation of this latter circumstance, and as the result of several series of experiments that I brought before you in connexion with this subject, we had arrived at the following law—viz., that the decrease in the illuminating power is directly proportional to the decrease in atmospheric pressure. As a concrete expression of the action of this law, we may say that if we begin with a flame which gives 100 units of light at 30 inches of mercurial pressure, we shall lose 5·1 of these units of light every time the barometer sinks one inch.

Now, what is the cause of the decrease of luminosity by the diminution of atmospheric pressure, and the corresponding increase of luminosity by the augmentation of atmospheric pressure? The chief cause of the difference is the increase in the volume, and therefore decrease of the density of those heavy hydrocarbon vapours to which we have attributed the luminosity of a gas-flame, when the atmospheric pressure is reduced, and *vice versâ*. By such a diminution of the density of these vapours it is obvious we must lose a portion of the luminosity they possess at the ordinary atmospheric pressure, as was exemplified in the combustion of arsenic in rarefied oxygen. This effect of pressure on the density of gases we have already investigated tolerably fully; but I wish to bring before you one or two more experiments in connexion with it.

In the first place, allow me to recall to your memory an experiment we made with the apparatus before me, in which we enclosed a mixture of two volumes of hydrogen and one of oxygen, at ordinary atmospheric pressure, and then fired the mixture by the electric spark. You noticed, at the moment of ignition, that a brilliant light was produced, whereas, when a mixture of the same gases was freely exposed to the air in soap bubbles, no trace of luminosity could be distinguished at the moment of the explosion. The difference between the results in the two experiments lies partly in the greater temperature we had in the interior of the strong vessel, which allowed of no expansion of the gases at the moment of explosion; but it depends principally upon the greater density of the gases under this condition of combustion. The gases in this apparatus possessed, at the moment of ignition, ten times the density of the gases exploded in free air. I have here a Cavendish's endiometer, which has been filled with a mixture of oxygen and hydrogen, and I will pass an electric spark through it. This mixture is at the ordinary atmospheric pressure, and, therefore, at the moment of ignition it will be ten times as dense as when exploded in open air. [Experiment performed, and a dazzling light produced.] I will now put into this vessel the same mixture of gases, but at a pressure to the extent of one-tenth of an atmosphere only. On explosion the temperature will be somewhat lower than before, but immensely higher than when hydrogen burns in common atmospheric air, and at the moment of ignition the gaseous mixture will only have the same pressure as that of atmospheric air. Therefore, we may expect a greater diminution of light; indeed, it will not be much greater than that which results from the combustion of hydrogen in ordinary atmospheric air. [Experiment performed.] At the moment of the explosion we had a pressure of about 30 inches of mercury in the interior of the vessel, consequently the ignited product of combustion—steam—had only the same density as it possessed when formed by the combustion of the gases in free air, and the light produced upon ignition was only just perceptible through the theatre.

There is one more experiment in the same direction which will complete this part of our subject—viz., the demonstration of the dependence of light upon the density of the gases at the time of their ignition. The following is the experiment:—Fill a Cavendish's endiometer with a mixture of atmospheric air and hydrogen—the same mixture which we have when a flame of hydrogen burns in free air—and which, as we have seen, produces practically no luminosity at all. I adapt, however, the conditions of this experiment in such a way that at the moment of ignition there shall be a pressure of ten atmospheres inside the glass vessel. In order to get this pressure we must pump in some additional gas beyond that which enters the vessel at ordinary atmospheric pressure, and we shall then get just such a pressure as we had in the first experiment. But you must remember that, in the experiment with the mixed gases which we are now going to explode, we have a great quantity of nitrogen, and all this nitrogen shares the heat produced by the explosion, consequently the temperature will be greatly diminished; still we shall find that we get a much greater amount of light—not so dazzling as in the first experiment, but yet sufficient to exemplify the difference between the burning of these gases at the common pressure of the atmosphere and burning them under the increased pressure of ten atmospheres, and when, therefore, they are ten times as dense. [Experiment performed.] Such, then, is the first and chief cause of the variation in the amount of light which accompanies variations in atmospheric pressure.

But there is also another cause, which was believed, till lately, to be the only one—viz., the access of external atmospheric air in larger quantity into the interior of the flame when the latter burns under reduced pressure, and its comparative exclusion when the combustion takes place under increased pressure. The effect being due to the greater mobility of gaseous particles at low than at high pressures.

Now, the operation of the law of reduction of light by reduction of pressure is such, that the illuminating effect of the same gas, when burned in different localities, is liable to very considerable variations. For instance, if we were to burn in Munich the same sample of gas that we are burning in London—Munich being 1700 feet above the level of the sea—we should find that an amount of gas which here gives the light of 100 candles would there give only the light of 91 candles; and if the same gas were burned in the city of Mexico, which is about 7400 feet above the level of the sea, it would give the light of only 61¼ candles. These calculations are entirely independent of the consideration of change of volume; if this be taken into account, the difference becomes much greater. Equal volumes of gas burned in London and Mexico would give quantities of light which would bear the proportion of 100 to 46·2. So much, then, for the first condition of luminosity—viz., that condition which depends upon the amount and quality of the dense hydrocarbon vapours contained in the shell of combustion at any given moment.

We have now to look at the second condition—viz., the temperature to which those dense hydrocarbon vapours are heated—the temperature to which the flame is raised. The light of every ignited body is augmented by an increase of temperature. For instance, I take a cylinder of lime, and heat it by means of a hydrogen flame. The result is very little luminosity indeed. But if the temperature be increased, which can be done by feeding the hydrogen flame with oxygen, we find that the luminosity of the little cylinder of lime is increased enormously. From this experiment we see that temperature is an essential condition determining the intensity of the light emitted by any ignited solid substance. The same is also true of a liquid. If we take a piece of platinum wire, and hold it in the flame of hydrogen alone, we get a very slight amount of luminosity. But when the flame is fed with oxygen the platinum is liquefied, and you observe the brilliant light obtained, the reason being that the temperature has become very much higher. In fact, in the combustion of hydrogen in air we get a temperature of 3776° Fahr., whereas when we feed the flame with oxygen we raise the temperature to 7364° Fahr.

We may illustrate this further by another experiment. Here is a piece of carbon which I ignite in this hydrogen flame. You perceive merely a dull red glow; now I introduce oxygen, and the light emitted is considerably increased, but if this carbon be made part of a voltaic circuit, as is now being done, its temperature is enormously increased, and so is its luminosity.

What is true of solids and liquids in this respect is true also of gases and vapours. Hence, if the temperature of a gas-flame be augmented, the same amount of luminous heavy hydrocarbon vapours will emit more light—nay, a much less amount of hydrocarbon vapours may emit more light than a larger quantity at a lower temperature. Here, for instance, is a common Argand gas-burner, from which gas is burning in the ordinary manner. I now introduce a stream of oxygen into the interior of the flame, and you see that we obtain a great increase of luminosity. Here, too, is another apparatus which will serve to illustrate the same thing. I have before me a jet, from which coal gas is burning freely in air. We get a certain amount of light. But now if I feed the interior of the flame with oxygen, I raise the tem-

perature of the hydrocarbon vapours very considerably, and the result is a great increase in the intensity of the light. In both those experiments there cannot be a doubt that the amount of heavy hydrocarbon vapours in the flame, when the latter was emitting the greatest amount of light, was much less than when it was fed with atmospheric air, because in the former case more oxygen gained admission to the interior of the flame, and consumed a considerable amount of the heavy hydrocarbon vapours; consequently a smaller amount of hydrocarbon vapour, if heated to an intense temperature, will produce more light than a larger quantity burned in atmospheric air.

Now the temperature of an ordinary gas-flame may be augmented in three different ways. In the first place, by the process we have just been adopting—viz., by feeding it with oxygen. But this process is impracticable: we could never submit to a double set of pipes, one supplying coal gas and the other oxygen.

The second plan by which the temperature of a gas-flame may be augmented is by increasing the cooling surface of the flame. This is a very important condition in the economical consumption of gas, and it is well known that if the volume of the flame be increased in proportion to its surface, an increased amount of light is obtained. Upon this depends the fact that a large gas-flame gives more light per cubic foot of gas consumed than a small one, the gas being of the same quality in both cases. This result is shown in a series of experiments with two different kinds of gas, No. 1 and No. 2, of which the following table gives the results:—

Illuminating Power of the same Gas when Burned at Different Rates.

Rate per hour.	Illuminating Power per Cubic Foot per hour. No. 1.	No. 2.
0·3 cubic feet	3·3 candles	—
1 ,,	6·5 ,,	—
2 ,,	7·2 ,,	3·0 candles
3 ,,	8·6 ,,	3·4 ,,
4 ,,	— ,,	3·8 ,,
5 ,,	10·5 ,,	4·0 ,,

In fact, if in any given room or theatre, for instance, you required to consume 100 cubic feet of gas per hour, you would get more light if you burned that gas in a single flame than if you consumed it in a number of cubic flames—*i.e.*, 20 burners, consuming each 5 feet of gas per hour, would give less light than if the whole 100 cubic feet were burned in the same time in a single burner.

The third process by which the temperature of a gas-flame may be augmented consists in heating the air with which it is supplied, or both the gas and the air, to a high temperature—say to the temperature of melting lead—before entering into combustion. This is a very important consideration in the consumption of gas, and I will endeavour to exemplify it by a simple experiment. The apparatus I employ consists of a charcoal furnace, with numerous apertures at the sides for the admission of air. Through the centre of this furnace rises a wrought-iron tube, which has an internal diameter of about one inch, and which is designed to supply hot air to the gas-flame. Inside this wrought-iron tube is a smaller one of copper, through which gas is conveyed to the top of the furnace. I ignite this gas at the extremity of the copper tube, and then, upon a little air-tight ledge provided for the purpose, I place a glass chimney, so that the gas-flame shall be fed with hot air only. There is another similar copper tube, from which a similar gas-flame is burning in cold air. You observe at once the great difference in the luminosity of the two flames. The superior light given by the gas which passes through the heated tube in the furnace is due entirely to the circumstance that the gas and the air are heated nearly to redness before they come together for combustion.

This process of heating both air and gas in the consumption of the latter has been applied in the construction of a lamp, of which I have here a specimen. It consists of a stand or pedestal, containing a tube through which the gas passes. On the top of this tube is a Leslie burner, though any other form of Argand burner may be employed. The burner is furnished with a chimney of the kind used with the Leslie burner, a little contracted near the flame. But the peculiarity of the construction of this lamp consists in the introduction in the gas-pillar of a circular piece of plate glass, upon which a second glass shade can rest air-tight. This arrangement obviously causes the atmospheric air to stream down the heated sides of the internal glass. The air thus becomes highly heated before it is brought in contact with the gas; and, as this very hot air streams over a portion of the burner, it raises the burner itself to a temperature not far below redness, and thus both air and gas are strongly heated before combustion. In this way a very considerable increase of light is produced with the same amount of gas, or the same amount of light can be obtained with a greatly diminished consumption of gas. Here is a table showing the result of experiments made with a lamp of similar construction, in which, however, the second glass was placed very much nearer to the internal, so that the gain was greater than it would be with the lamp now before me.

Increase of Light by Heating Air and Gas before Combustion.

Cubic Feet of Gas per hour.	Light with Air and Gas cold.	Light with Air and Gas hot.
2·2	—	13·0 candles
2·6	—	15·5 ,,
3·3	13·0 candles	21·7 ,,
3·7	15·5 ,,	—
Gain in light with equal consumption of gas		67 per cent.
Saving of gas with equal light		46 ,,

There is an experiment which I have repeatedly made upon this table before you, and which has always struck me as curious in its results. It is the one in which atmospheric air is made to burn in coal gas. I have here a glass cylinder, filled with coal gas, inside of which I ignite a jet of air. Now, the curious thing which always struck me in connexion with this experiment was this—that a jet of air burning in coal gas gives practically no light. The cause is, doubtless, this—that when coal gas is burnt in atmospheric air you have a thin stratum of coal gas, surrounded on all sides with radiating surfaces of flame. The hydrocarbons within this stratum are not only thus exposed to radiation from all sides, but they are compelled to pass through the flame. The case is, however, very different if you reverse the conditions, and have a flame of air burning in coal gas. Here the coal gas is exposed to radiation on one side only, and is not compelled to pass through the flame. If this explanation be correct, and we provide a second flame to radiate through the gas, then the thin sheet of gas between the two flames ought to be in much the same condition as the thin sheet of gas in an ordinary fishtail gas-flame, and we ought to get increased luminosity. [Experiment made with two flat flames of air burning in the atmosphere of coal gas close to each other, the result being a luminous flame where the thin sheet of gas was hemmed in between the two strata of burning air.]

Finally, allow me to direct your attention to a source of great loss of light in the burning of gas, as usually carried out, and which is, perhaps, unavoidable. I allude to the loss of light which results from the use of glass shades or chimneys which are employed to surround the gas-flame. For instance, the loss of light from even the most transparent glass is estimated by Dr. Letheby—to whom I am indebted for the following table—as equal to 12 per cent.:—

Loss of Light by Glass Shades.

	Loss per Cent.
Clear glass	12
Slightly ground in pattern	24
Half ground	35
All ground	40
Opal glass	60

This fact ought to be taken into consideration in comparing the light of gas-flames with that of candles, because we do not require so to shade candle-flames to subdue their glare.

Shortly summarized, therefore, the conditions for obtaining maximum light are—

1. The greatest amount of luminous vapour contained in the flame.
2. The retention of this vapour for the longest possible time in the flame.
3. The production of the highest possible temperature in the flame; and
4. The highest atmospheric pressure.

Three out of four of these conditions are within our control; the fourth evidently is not—we cannot control the pressure of the atmosphere, and it would probably be impracticable to burn coal gas in an artificially compressed atmosphere in order to increase its luminosity.

We now pass on to a study of the chief constituents of crude coal gas after passing the condensing apparatus, but before having its impurities separated. They are enumerated in this table:—

Constituents of Crude Coal Gas.

Impurities.

Sulphuretted hydrogen.	Carbonic acid.
Carbo.-sulphur compounds	Bisulphide of carbon.
Ammonia.	

Diluents.

Hydrogen.	Marsh gas.
Carbonic oxide.	

Illuminants.

Oleflant gas.	Propylene.
Butylene.	Acetylene.

By illuminants, I mean those gases which are contained in coal gas as it is delivered to consumers, and which, by decomposition within the flame, yield those heavy hydrocarbons to which the luminosity of the flame is mainly, if not entirely due. Probably no one of these hydrocarbons is itself directly an important source of light; it is the heavy hydrocarbon vapours, generated by its decomposition, which constitute the real and direct source of light in a gas-flame.

We will consider shortly the impurities which are mentioned in the above table. Sulphuretted hydrogen is formed by the combination of sulphur and hydrogen at a red heat. Coals of the very best quality always contain a compound known to mineralogists as iron pyrites—a compound of iron with sulphur—called by chemists bisulphide of iron. Now, when hydrogen comes in contact with this compound, at the temperature at which gas is made in the retort, it takes up from it a quantity of sulphur, and become converted into sulphuretted hydrogen. Here is some of this sulphide of iron in a bulbed tube heated to redness. I pass hydrogen through the tube. [Experiment performed.] On applying, as a test, acetate of lead paper to the escaping gas, you observe that the paper at once becomes discoloured—a black sulphide of lead is formed, indicating the presence of sulphuretted hydrogen.

Sulphuretted hydrogen is a colourless transparent gas, possessing a most disagreeable odour, which has been commonly compared to that of putrid eggs. Its specific gravity is slightly more than that of common air, being 1·171. One of its peculiarities is its property of discolouring paint. Almost all paint contains carbonate of lead, which is acted upon by sulphuretted hydrogen exactly in the same way as the test-paper I have been using to ascertain the presence of this gas. It is, therefore, an exceedingly objectionable impurity in coal gas; but it is never present in the gas supplied to the metropolis. I do not know of a single instance in which it has not been completely removed in the process of purification. It burns with a blue flame, entirely destitute of light.

The other sulphur compounds in crude coal gas are of much greater importance to us. The principal of these is bisulphide of carbon. Here is a specimen of it. It is a volatile, colourless, very inflammable liquid, of an insupportable odour, and boiling at 108° Fahr. It is always present in coal gas, but it is in excessive quantity in the gas delivered to consumers in London. It burns with a blue and lightless flame. We have, in fact, already used it for the production of an almost lightless flame when consumed in atmospheric air, but a flame which exhibits intense luminosity when consumed in oxygen. Its inflammability is such that it may be ignited by a glass rod simply warmed in a gas-flame. [Experiment shown.]

Now, several gases when contaminated with bisulphide of carbon become exceedingly inflammable, and capable of ignition at the low temperature at which the bisulphide itself ignites. For instance, if hydrogen, which requires a full red heat for its ignition, be mixed with a small quantity of the vapour of bisulphide of carbon, it will, when so contaminated, be ignited by a glass rod merely warmed in a gas-flame. [Experiment shown.] In fact, at a temperature of about 400° Fahr., this mixture of hydrogen and bisulphide of carbon vapour inflames. The same is the case with carbonic oxide if contaminated with this impurity.

Fortunately, however, for us as consumers of gas, this property of easy ignition is not shared by coal gas when so contaminated. The moment the least trace of coal gas becomes mixed with the contaminated hydrogen, the ignition point of the mixture rises to the ignition point of the gas before contamination. The slightest trace of olefiant gas produces the same effect, but no such elevation of the igniting point occurs from the addition of the vapour of benzole, or of coal naphtha, to the mixture of hydrogen and bisulphide of carbon. [Experiment shown—a red-hot iron applied to the orifice of a tube through which the contaminated gas escaped, failed to ignite it; it was, however, inflamed on applying a glowing coal.] Thus all danger arising from the intermixture of bisulphide of carbon with coal gas, as regards easy inflammability, is entirely removed by this curious property of coal gas, to raise the ignition point of bisulphide of carbon. One of the products of the combustion of bisulphide of carbon—viz., sulphurous acid—possesses powerful bleaching properties. [Experiment performed—a red rose was exposed to the fumes arising from the flame of bisulphide of carbon, and in a few seconds the whole of its colour was discharged.] Such is the action of bisulphide of carbon on many colours, and hence some of the disagreeable

results which follow from the combustion of coal gas as now manufactured in London, in apartments which are not well ventilated, or from which the products of combustion are not removed by some special provision.

THE NEW STREET-LAMPS IN DUBLIN.

The Alliance and Dublin Consumers Gas Company, in accordance with their engagement with the corporation, are now exchanging the old heavy-looking gas-lanterns for new and elegant ones, from plans and designs registered by Mr. Cotton, the corporation inspector of public lighting. During the present week several streets have at night presented a very brilliant appearance in consequence of this alteration; and when the whole city is similarly lighted, a very decided improvement will be obtained in the illumination of the streets. The lanterns are six-sided, with three wrought-iron bars to support the glass, and secured to a tripod. The shadow thrown upon the ground is consequently much lessened, the old heavy cradle and side-bars being dispensed with. By a simple and effective arrangement the lamps are lighted and extinguished without the aid of a ladder. The pillars are of a graceful shape, the base forming a box containing a meter, in accordance with the plans of Mr. Cotton, to whom must be accorded the merit of introducing this improved system of public lighting. The whole of the contract has been executed in Dublin, the lanterns and meters being made at the Irish Meter Manufactory, Hanover Street. We may congratulate the public as well as the corporation on this change, which is a decided improvement on the old lamps, and adds considerably to the illumination of the streets. The plan, as well as the manner in which they have been put out of hand, reflects most creditably on all parties concerned; but in this latest city improvement a prominent place must justly be accorded to Mr. Cotton, the efficient officer of the corporation, whose ingenuity and practical experience have produced an improvement in the public lighting, the necessity of which was long felt by the citizens.—*Freeman's Journal.*

THE FAVERSHAM GAS COMPANY.—The directors have commenced making extensive alterations at their works, in the construction of a new tank and gasholder (the latter capable of storing upwards of 50,000 cubic feet of gas), erecting new retort-house for 46 retorts, new coal-store, and other buildings; in fact, it is understood that the whole plant and works will be remodelled under the direction and from plans prepared by the company's engineer, Mr. Darney. These alterations have been found necessary in order to meet the increasing demand for gas in this town, and also to enable the company to manufacture their gas with greater economy.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

Dr. *Profit and Loss, Half Year ending Dec.* 31, 1866. *Cr.*

To Coals			£8,276	2	0	
Purifying materials and process			112	11	0	
Repair and maintenance of meters, mains, service-pipes, and other works			1,676	17	9	
Wages			1,248	2	1	
Lamps—providing, lighting, extinguishing, cleaning, and repairing			256	15	1	
Rent, rates, and taxes			367	2	2	
Salaries, collectors commissions, and payments to directors			1,489	6	8	
Interest on loans			568	5	1	
Professional charges and incidental expenses			136	3	3	
Half per cent. on cost of works (£124,000) for depreciation			620	0	0	
Dividend paid to proprietors—10 per cent. on £100,000 capital, raised under Act Vict. 2, c. 38			5,000	0	0	
Miscellaneous payments—						
Amount carried to reserve-fund			31	6	0½	
Balance carried to next half year's account			2,290	17	0	
		£22,073	8	1½		

By Balance brought from last half year's account			£5,031	6	0½	
Sale of gas, after deducting £179 12s. 8d., estimated discounts and bad debts			14,319	7	3	
Coke and breeze			2,262	17	3	
Tar and other residuals			459	17	7	
		£22,073	8	1½		

Dr. *Balance-Sheet, Half Year ending Dec.* 31, 1866. *Cr.*

To Capital raised—						
Under Act Vict. 2, c. 38	£100,000	0	0			
Ditto 6, c. 21	—					
Ditto 17, c. 42	—					
Ditto 29, c.	2,520	0	0			
	£102,520	0	0			
Amount of loans	26,000	0	0			
Reserve-fund	1,880	13	11½			
Depreciation-fund	620	0	0			
Amount owing by the company	15,189	10	2			
Unclaimed dividends	58	7	6			
Balance as above	2,290	17	0			
	£148,559	8	7½			

By Cost of works	£115,939	4	9½			
Ditto (add extensions made during the half year)	8,095	19	2			
	£124,035	3	11½			
Amount invested of the reserve-fund	1,880	13	11			
Calls unpaid	125	0	0			
Amount owing to the company for gas, coke, residual products, fittings, &c., exclusive of estimated bad debts	12,801	3	4½			
Coals in stock	3,596	16	5			
Residual products and other stocks	1,596	14	6½			
Cash in hands of treasurer, cashier, &c.	4,523	16	5			
	£148,559	8	7½			

Appropriation of Profit.

Profit unappropriated last half year	£1,880	13	11½			
December, 1866—profit balance	2,290	17	0			
	£4,171	10	11½			

Dividend for half year on share capital, at 5 p. cent. per ann.	£2,513	14	2			
Balance forward	1,657	16	9½			
	£4,171	10	11½			

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	15	0	2	13	3	2	12	6	3	10	0	3	10	0
1½ and 2-inch Socket-pipes	7	10	0	6	0	0	6	15	0	6	15	0	7	10	0
2½ and 3-inch ditto	7	0	0	6	0	0	6	5	0	6	10	0	7	0	0
4 and 5-inch ditto	6	10	0	5	10	0	5	15	0	6	0	0	6	10	0
6 inches and upwards ditto	6	5	0	5	0	0	5	10	0	5	15	0	6	5	0
Retorts, 1st fusion, hot blast	6	0	0	—			5	5	0	5	10	0	6	0	0
Ditto, 2nd ditto, cold ditto	7	0	0	5	15	0	5	15	0	6	0	0	7	0	0
Tank-plates, ¼ thick and above	6	10	0	5	10	0	5	10	0	5	15	0	6	5	0

WROUGHT-IRON TUBING,

Subject to 50 *per cent. Discount.*

	2 in.		1½ in.		1¼ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Patent Welded Tubes, from 3 to 12 feet—per foot	1	8	1	0	0	10	0	7	0	5	0	4½
Ditto ditto, from 6 inches to 18 inches—each	2	0	2	0	1	9	1	3	1	0	0	9
Connecting-pieces, or Long Screws	3	6	2	3	2	0	1	6	1	2	0	11
Bends, Springs, and Elbows (wrought iron)	3	9	2	3	1	9	1	0	0	10	0	8
Tees, wrought or cast	4	0	2	6	2	0	1	6	1	1	0	10
Crosses, ditto	4	6	3	0	2	6	2	0	1	6	1	2
Iron Cocks	17	6	9	6	7	6	4	6	3	3	2	6
Ditto, with brass plug	28	0	16	0	13	0	7	0	5	6	4	6
Diminishing Sockets, Caps, Plugs, and Nipples	1	3	0	9	0	8	0	6	0	5	0	4
Plain Sockets	1	0	0	8	0	7	0	5	0	4	0	3
Syphons, 2-quart	15	0	14	0	13	6	12	0	12	0	—	

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Haswells, Nettlesworth Primrose, and South Pelaw	7s. 6d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	8 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead (at Leith)	35 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	25 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	32 6
Ditto (at Granton)	30 0
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	23 0
Pirnie	15 0
Lothian's Cannel (at Leith)	23 0
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	5s. 9d
Cork	9s. to 9 6
Dover, Folkestne, & Ramsgate	4 3
Dublin	9s. 6d. to 10 0
Exeter Quay	9 0
Ipswich	5 6
London (from Leith)	8s. to 8 6
London (Pool)	6 0
Lowestoft and Yarmouth	4 9
Portsmouth & Southampton	7 6
Plymouth	8 0
Shoreham	7 0
Whitstable	5s. 6d. to 6 0
Weymouth	7 9
Foreign.—Per Keel:—	
Barcelona	£20 0
Bordeaux	13 0
Boulogne and Calais	6 15
Cadiz	11 0
Cronstadt	9 0
Copenhagen	7 10
Genoa	19 0
Hamburg	7 15
Havre de Grace	9 10
Leghorn	19 0
Lisbon	12 0
Rotterdam	7 5
Stettin	9 5
Trieste	19 0
Venice	21 0

SUNDRIES.

Best Natle. Fire-bks., p. 1000, £2 10s. to £2	15 0
Cliff's Fire-bks. (at Wortley), p. 1000	2 15 0
Ingham's ditto (at Wortley), p. 1000	2 15 0
Fire-clay Retorts, p. ft. run, 5s. 6d. to	6 7 0
Tough Cake Copper, p. ton	83 0 0
English Pig Lead, p. ton	19 10 0
Welsh Bar Iron (in London), p. ton	6 10 0
Foreign Spelter, p. ton	21 15 0
English Block Tin, p. ton	92 0 0
Banca, p. ton	94 10 0
Tarred Rope Yarn, p. cwt.	1 9 0

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum.	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited) . .	20 0 0	4 0 0	16 10 0
1000	20	Do., preference .	20 0 0	10 0 0	27 10 0
750	20	Do., do., redeem.	10 0 0	10 0 0	12 10 0
30000	5	Bombay (Limited) .	5 0 0	£5 intr.	4¼ to 4½
10000	5	Do., third issue .	4 0 0	£5 intr.	3¾ to 3¾
10000	20	British, Limited . (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	27 to 29
12000	50	*Chartered*	50 0 0	8 10 0	51 to 52
6000	50	Do.	35 0 0	8 10 0	35 to 36
10000	20	*City of London*, A shares	20 0 0	8 0 0	23 to 25
10000	10	Do., B shares	10 0 0	4 0 0	6½ to 7
8000	10	Do., new shares.	10 0 0	8 0 0	11½ to 12½
25000	25	City of Moscow (L)	25 0 0	£7 intr.	16 to 17
17490	25	*Commercial* . . .	25 0 0	10 0 0	33 to 34
2500	20	Continental Union.	20 0 0	8 0 0	14 to 15
17500	20	Do.	15 0 0	8 0 0	9 to 10
10000	20	Do., preference .	20 0 0	7 0 0	
5827	5	County & Gen. (L)	5 0 0	nil.	
2000	5	Do., preference . (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0	nil.	
5000	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 14
5000	10	Do., preference .	10 0 0	6 0 0	12½ to 13
10 000	10	Do.	2 10 0	7 0 0	2¼ to 3
4000	50	*Equitable*	50 0 0	10 0 0	65 to 66
4000	25	Do., new shares.	25 0 0	10 0 0	33 to 34
23406	10	European (Lim.) .	10 0 0	10 0 0	13 to 13¼
12000	10	Do., new shares. Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	6¼ to 6½
20000	10	*Gt. Cent. Gas Cons.*	10 0 0	10 0 0	12½ to 12⅝
5000	10	Hong Kong (Lim.)	10 0 0		8 to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	66½ to 67
1300	100	Do., bonds . . .	£100	10 0 0	175 to 180
7000	25	Imperial Austrian.	10 0 0		
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	94½ to 95
400	100	Impl. Mexican (L.)	75 0 0		
3000	40	*Independent* . . .	40 0 0	10 0 0	53 to 56
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	60 to 61
5610	25	Do., 1st pref. .	25 0 0	6 0 0	25 to 27
503	50	Do., 2nd pref. .	50 0 0	6 0 0	
214	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sh		6 0 0	
11828		Do., 2nd pref. sh		5 0 0	
30000	5	Malta & Medit. (L.)	5 0 0	3 0 0	3¾ to 4
6000	5	Do., preference .	4 0 0	7 0 0	4 0 0
30000	5	Oriental, Calcutta	5 0 0	8 10 0	5¼ to 5½
30000	5	Do., new shares.	1 0 0	8 10 0	1 to 1¼
10000	5	Ottoman (Limited)	5 0 0		1¼ to 2⅛
10000	10	Pará (Limited) . .	10 0 0	6 0 0	9¼ to 9½
27000	20	*Phœnix*	20 0 0	10 0 0	25 to 25½
3600	100	Do., new	25 0 0	7 10 0	24 to 25
144000	Sk.	Do.	100 0 0	5 0 0	72 to 74
5000	20	*Ratcliff*	20 0 0	10 0 0	22 to 24
	20	Rio de Janeiro (L.)	20 0 0	10 0 0	21 to 22
6959	5	Singapore (Lim.) .	5 0 0	3 10 0	
2000	5	Do., preference . Shanghai	5 0 0	7 10 0	
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	70 to 72
15000	10	*Surrey Consumers*	10 0 0	10 0 0	13½ to 13¾
10000	10	Do., new	5 0 0	10 0 0	7 to 7¼
9000	4	United General . . (Limerick)	4 0 0		
10000	10	*Victoria Docks* . .	5 0 0	6 0 0	
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13½ to 14
20000	10	Western (L.) A sh.	10 0 0	10 0 0	13½ to 14
10000	10	Do., B shares.	5 0 0	10 0 0	6¼ to 7
10000	10	Do., C shares.	4 0 0	10 0 0	5½ to 5¾
20000	10	Do., D shares.	1 0 0	10 0 0	1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 15 0
551	10	West London Junction (Lim.) . .	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

Advertisements.

WILLIAM & BENJAMIN COWAN,

(ESTABLISHED 1827,)

WET AND DRY

GAS-METER MANUFACTURERS,

BUCCLEUCH STREET WORKS, EDINBURGH.

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

TO GAS COMPANIES.

WANTED, by a person of experience, an APPOINTMENT as Manager, Collector, or Inspector. The Advertiser is well acquainted with, and has fulfilled for 25 years the duties of the several positions, and can give good reference.

Address J. R. T., 88, Lorrimore Road, WALWORTH, S.

TO GAS ENGINEERS.

WANTED, by the Hereford Gaslight and Coke Company, a MANAGER for the works. He will be expected to be competent to prepare plans and estimates for the alterations of or additions to the existing works, as well as the manufacture and distribution of gas; also to keep the accounts, and conduct the general business of the Company. He must devote the whole of his time to the duties of the office. Security will be required. Salary £160 per annum, with house, garden, rates, taxes, coals, and gas.

Applications, with testimonials, to be addressed to the Secretary, Savings Bank, Hereford, on or before the 16th of April, 1867.

By order,
J. T. OWEN FOWLER, Secretary.

Hereford, March 25, 1867.

TO CIVIL ENGINEERS & GAS MANAGERS.

A Young Gentleman, aged 22, desires a SITUATION as Assistant Engineer or Manager, at home or abroad. Has been nearly 6½ years with a gas engineer. Understands gas work generally, also levelling and surveying, and taking out quantities. Would be willing to take a small salary at first. First-class references can be given, and good testimonials produced.

Address A. E., care of Mr. Pettitt, 70, Ludgate Hill, LONDON, E.C.

WANTED, a Situation as Manager of a country gas-work. Is quite capable of taking the entire management, also a thorough knowledge of laying mains and services, and smith's work. Eighteen years character.

Address B. BLAKE, Gas-Works, Handsworth Woodhouse, near SHEFFIELD.

WANTED, by a young Man, a SITUATION at Gas Fitting, Meter Fixing, &c.

Address S. S., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, 2 Purifiers, 4 ft. square and 42 in. deep, with wrought-iron covers, sieves, complete, £30; 2 Purifiers, 4 ft. by 20 in. and 30 in. deep, with covers, sieves, 2 4-in. valves, cover-lifting apparatus, £35.

A second-hand 8-in. Four-way HYDRAULIC VALVE—good condition and cheap—£28.

At CUTLER'S, Wenlock Road, City Road, LONDON.

LISBURN GAS-WORKS.

WANTED, on the 1st of July next, a MANAGER for the above work. He will be required, besides taking the general management of the works under the Chairman and Directors, to keep the accounts and take the indication of the meters, but not to collect the gas-rents. He must be competent to superintend alterations and additions to the works when needed.

Security to the amount of £200 will be required for the due discharge of the duties of the situation.

Salary £100 a year, with a residence, office houses, and gardens.

Applications, with testimonials as to character, ability, and experience, to be forwarded to "The Chairman of the Lisburn Gaslight Company, Limited," before the 1st of May next.

Lisburn, Co. Antrim, Ireland,
March 1, 1867.

BODMIN GAS CONSUMERS COMPANY,
LIMITED.

GASHOLDER.

TENDERS are requested for enlarging one of the GASHOLDERS at the works of the Bodmin Gas Company.

Full particulars may be obtained, and a specification of the work required may be seen, on application to Mr. JAMES THOMAS, the Manager at the Works, or to the undersigned, to whom sealed tenders, stating the lowest price for which the work will be done, must be sent before the 1st of May next.

By order of the Directors,
PRESTON WALLIS, Secretary.

N.B.—The Directors do not bind themselves to accept the lowest or any tender.

Dated Bodmin, March 22, 1867.

LIMERICK CORPORATION GAS-WORKS.

THE Gas Committee of the Limerick Corporation desire to receive TENDERS for the supply of 4000 tons of GAS COALS, f.o.b., or delivered on the Quays, at Limerick.

The Contractor will have to deliver the Coals in quantities of 660 tons, or thereby, monthly, until the contract is completed. It will be optional to deliver any quantity monthly beyond this, but the Committee will not be required to pay for more than the specified quantities.

Tenders to specify the name of coal, &c., to be addressed to the Manager, Corporation Gas-Works, Limerick, will be received up to the 15th of April, 1867.

By order,
JOHN MACNIE, Manager.

TENDERS FOR GAS LIQUOR & BREEZE.

THE Devonport Gas and Coke Company is desirous of receiving TENDERS for the AMMONIACAL LIQUOR and BREEZE produced at these works. The quantity of Liquor per annum is estimated at 60,000 to 70,000 gallons—standard about 5; Breeze, about 500 tons.

For specifications, apply at the works. Tenders must be posted not later than the 12th of April, addressed to the CHAIRMAN.

Gas and Coke Works, Devonport.

TO GAS ENGINEERS.

THE Directors of the Kingsbridge Gas Company are desirous of receiving Plans, Specifications, and Tenders for supplying and erecting, during the ensuing summer, a NEW TELESCOPE GASHOLDER, complete, rising 24 ft. in two lifts of 12 ft. each, exclusive of the seal. The outer lift to be 30 ft. in diameter. Every portion of the apparatus necessary for the erection and completion of the Gasholder to be supplied by the Contractor, including the foundation bolts for holding down the columns; but the Company are prepared to excavate and build the tank, and supply and fix the inlet and outlet pipes. The Contractor deciding on the positions of the foundation bolts, &c., forthwith.

Tenders, accompanied by plans and specifications endorsed "Tender for Gasholder," to be sent not later than Tuesday, the 16th day of April proximo, to the Secretary of the Gas Company, Kingsbridge, Devon, of whom any further information may be obtained.

No allowance will be made for plans, specifications, or tenders; nor do the Directors pledge themselves to accept the lowest or any tender.

By order of the Directors,
W. JARVIS, Secretary.

Kingsbridge, March 6, 1867.

TENDERS are Wanted by the Directors of the Aldershot Gas and Water Company, for the PURCHASE of the almost new manufacturing plant of a small Gas-Work, capable of making 3,000,000 feet annually.

A preference will be given to any one taking the whole, which can be seen by applying at the Office, Bank Street, ALDERSHOT.

FOR SALE, a set of 4 Cast-Iron Dry-Lime PURIFIERS, 10 ft. square and 3 ft. 6 in. deep inside, together with hydraulic centre-valve for 10-in. connexions, and 2 sets of cast-iron girders, 46 ft. 3 in. long, with lifting crabs.

Also a 30,000 feet per hour BEALE'S EXHAUSTER, with 8-in. Walkers' valves.

A 12-in. PARKINSON'S STATION-GOVERNOR.

All in excellent order, and sold in consequence of larger being substituted.

Application to be made to the MANAGER of the Leicester Gas-Works.

TO GASHOLDER MAKERS.

THE Gas Company, Worcester, intend in the spring of 1868 constructing a TELESCOPIC GASHOLDER, 138 ft. diameter, by a depth for the upper lift of 31 ft., and for the lower of 30½ ft., and solicit tenders for the work.

Further information may be obtained, specifications (21s. per copy) can be had, and the drawings seen at the Company's Offices, WORCESTER, and with Mr. WILLIAM ESSON, Engineer, Ness House, CHELTENHAM.

Tenders for the work will have to be delivered free to JOSIAH STALLARD, Esq., Chairman of the Company, on or before noon, the 2nd of May next.

Worcester, March 15, 1867.

ECONOMY IN GAS PURIFICATION.

Mc DOUGALL'S

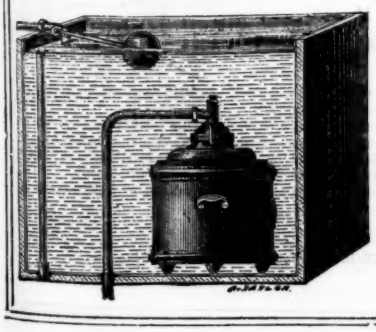
HYDRATED PEROXIDE OF IRON.

This Oxide is now well known, and has commended itself for efficiency and durability. It is free from any mixture of sawdust or other material, every particle being available for use, thus causing the Purifiers to work double the time before it requires renewing. It readily takes up sulphur, revivifies rapidly, and lasts longer than any other Oxide in the market. Prices on application to—

ALEX. Mc DOUGALL, Manufacturing Chemist,

LONDON—11, Arthur Street West, London Bridge, E.C.; MANCHESTER—Riga Street, Shudehill.

HOUSE CISTERN FITTED WITH A CISTERN FILTER.



THE LONDON & GENERAL
WATER PURIFYING COMPANY, LIMITED.

PATENT CISTERN FILTER, CHARGED SOLELY WITH ANIMAL CHARCOAL.

THE LATEST PATENTED FILTER IN GENERAL USE,

And requiring, when once fixed, no attention whatever.

Patronized and used by Her Majesty the Queen at Osborne, by H.R.H. the Duke of Cambridge, the *élite* of the Medical Profession, and at the Fusilier Guards, Middlesex, St. George's, German and London Hospitals, and at the Regent's Park and Tower Barracks, and numerous Institutions, Breweries, &c.

PRICES:

Filter No. 1, yielding ½ gall. p. minute .	£1	10	0	Filter No. 3, yielding 2 gall. p. minute .	£3 0 0
Filter No. 2, yielding 1 gall. p. minute .	2	0	0	Filter No. 4, yielding 4 gall. p. minute .	4 10 0

The Filters may be seen in operation, and full particulars obtained, on application to the SECRETARY, at the Offices,

157, STRAND, LONDON, W.C. (Four Doors from Somerset House).

THE

GAS-METER COMPANY, LIMITED,

A. ANGUS CROLL, C.E., Chairman.

GEORGE RAIT, MANAGING DIRECTOR. T. G. BARLOW, C.E., CONSULTING ENGINEER.

CROLL'S DRY GAS-METER,

(Invented and Patented in 1844, since which time 200,000 of these Meters have been manufactured by Mr. CROLL,)

Obtained **PRIZE MEDALS** at the EXHIBITIONS of London, 1851, of New York, 1853, and Paris, 1855.

IMPROVED in 1858,

And was awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for

"GOOD CONSTRUCTION and SOUND WORKMANSHIP."

Now manufactured by the GAS-METER COMPANY, LIMITED, KINGSLAND ROAD, LONDON; and, for the purpose of obtaining greater accuracy in all its parts, the most perfect machinery has been adopted, "By which the construction of the Meter is much simplified, while its liability to get out of order is diminished." (See report of T. G. BARLOW, Esq., C.E.)

ORLANDO BROTHERS'

SELF-ACTING DISTRICT GOVERNOR.

Prices, according to size, can be obtained upon application to

Mr. WILLIAM ARCHER,

METER COMPANY'S WORKS, OLDHAM.

KROMSCHROEDER AND CO.,

GAS ENGINEERS,

PATENTEES AND MANUFACTURERS OF

WET AND DRY GAS-METERS.

IMPERIAL METER-WORKS,

KING'S ROAD, CAMDEN TOWN,

LONDON, N.W.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS,

PLAIN, GALVANIZED, & ENAMELLED, for Gas, Steam, and Water, from ⅛ in. to 6 in. bore.

STOCKS, TAPS, and DIES, GUN METAL GLAND-COCKS, WATER-GAUGES, &c.

PATENT LAP-WELDED IRON TUBES

For Locomotive and Marine Boilers, &c.

LONDON WAREHOUSE—No 66, QUEEN STREET, E.C.

1862.

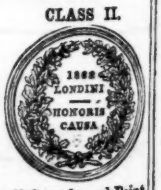
PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.



This Paint having been in general use over four years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (28s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs under 20s. per cwt., as compared with White Lead at 28s. per cwt.

FRASER'S PATENT RETORTS.

THE RIBBED IRON RETORTS

Have now been in use about three years, and continue to give satisfaction. The

PATENT CLAY RETORTS

Will work off the Gas from the Coal in less time, and Carbon does not form in them so freely, nor adhere so firmly, as to Plain Retorts.

Further particulars and prices on application to Mr. A. C. FRASER, Engineer to the Gas Company, COLCHESTER.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gasfittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gasfittings and Gas Apparatus.

MARTIN'S

LEE MOOR PORCELAIN FIRE-BRICKS,

Containing no Lime, and only ·45 of Oxides, resist the strongest heats, and will last for Gas-Works longer than any others.

Samples and prices sent, and the highest references given, on application to

MARTIN BROTHERS,

ST. AUSTELL, CORNWALL.

WALTER FORD,

159, GRAY'S INN ROAD, LONDON.

MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.

Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

JOSEPH BOULTON,

80, KING'S CROSS ROAD, AND

10½, GREAT PERCY STREET, CLERKENWELL.

Manufacturer of the Patent Dry and Improved Unvarying Water-Line Gas-Meters and Station-Meters, Governors, Experimental Meters, and Pressure Gauges, on the most improved principle.

Old Meters thoroughly repaired, and altered to meet the requirements of the Act of Parliament.

ALL METERS WARRANTED.

PATENT ECONOMIZERS,

ADAMAS-POINTED,

Union Economizer,
1-10th real size of Flame.

Bat's-wing Economizer,
1-10th real size of Flame.

Ensure a large, well-shaped, steady flame. The aperture never wears out, thus attaining uniformity of consumption, great brilliancy of light, freedom from roaring, flickering, or waste of Gas, and no smell of sulphur. One gives more light than a triple-branch ordinary burner.

At the Expense of not quite One Penny for full five hours, a most cheerful light is obtained, surpassing the illuminating power of Twelve best Sperm Wax Lights.

The combustion is perfect; there is no escape of carbonic acid, carbon (or SOOT), to discolour the ceiling, or injure the furniture.

All sizes kept in stock, suitable for cannel, mixed, and common gas, plug or taper screwed, to take the place of any old burner.

TESTIMONIAL.

Gas-Works, Portsea, January 2, 1867.

Dear Sirs,—I cordially respond to your invitation to give my opinion of your "ECONOMIZER." We have now not less than 8000 in use, all of No. 8 size, bat's-wing and fish-tails; and in no single instance have they failed to give a brilliant light, well-formed, and unaltered from day to day, with a minimum consumption of gas. Every gas engineer, who has had to struggle with the complaints of his customers, knowing them to arise solely from imperfect combustion of the gas for light-giving purposes, should introduce these burners, and he will find what I have found, universal satisfaction, in place of a great deal of discontent. On the other hand, the consumer will find it to his advantage to CONSUME his gas through this burner, as he will really get the value of what he is paying for. I can affirm with perfect confidence that this Company's consumers who now use this burner would not part with it if it cost six times as much.—I am, dear sirs, yours very truly,

J. DOUGLAS, Superintendent and Secretary,
Portsea Island Gaslight Company.

Messrs. Lambert Brothers, Walsall.

LAMBERT BROTHERS, Tube Mills, Gas-Fitting Manufactory,

WALSALL.

Agents supplied with Show-Cards and Tables of Consumption.

WANTED, a Draughtsman, who has a general knowledge of machinery, and can take out quantities. If accustomed to gas work preferred. A well qualified and energetic man will find this a desirable opportunity.

Address Y. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BALANCE-SHEETS AND REVENUE ACCOUNTS.

A FIRM of Accountants, much engaged in the preparation of Gas Companies Accounts, are open to contract for the keeping, balancing, or auditing the books of other Companies, which, from their experience, they are enabled to do on moderate terms.

Address, SANDELL & MADDERS, Accountants, 4, Skinner's Place, Size Lane, LONDON, E.C.

BEST & HOLDEN'S

PATENT APPARATUS

FOR

CHARGING & DRAWING GAS-RETORTS,

AND FOR

CLOSING THE MOUTHS OF RETORTS

WITHOUT CEMENT.

The above is one of the most important inventions in connexion with gas manufacture which has been introduced for many years, and merits the immediate attention of all Gas Companies. The Machine is simple in its construction, easily worked, and not likely to get out of order, while the saving in time and labour is very considerable. It has been applied at the Chartered Gas-Works, Westminster, with complete success, and has been viewed in operation by some of the most eminent gas engineers, both in London and from the provinces, their unanimous opinion being that the arrangement of the apparatus was perfectly new, and must eventually be adopted by all Gas Companies.

The Patentees are now in a position to treat for the use of their Apparatus, or to contract for carbonizing.

For further information apply to

JNO. CHISHOLM & CO.,

44, MARK LANE, E.C.

PHŒNIX GASLIGHT and COKE COMPANY.

NOTICE is hereby given, that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to Christmas last £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 3rd of April, at Twelve for One o'clock, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring a Dividend to Christmas last; to elect a Director in the room of Ambrose Boyson, Esq., resigned; and also Directors and an Auditor for the ensuing year; and on other business.

By order of the Court of Directors,
CHARLES PRIDDEN, Secretary.

70, Bankside, London, S.E., March 20, 1867.

All the Directors retire, but seven are to be re-elected; the remaining two, likewise the Auditor, offer themselves for re-election. The qualification is £2000 capital of the Company held for more than three months, and notice 14 days prior to the Meeting.

The half year's Dividend, at the same rates as the last, will be payable immediately after the business of the Meeting has terminated; and afterwards at the Company's Office, at Bankside, on Thursday, the 4th of April, from the hour of Twelve till Three, and then will be forwarded by post.

SAMUEL CUTLER, Gasholder MAKER and CONTRACTOR

For Tanks, Roofs, Purifiers, Condensers, Erection and Alteration of Works and every description of GAS APPARATUS.

PROVIDENCE IRON WORKS,
MILL WALL, POPLAR, LONDON, E.
Main Laying and Gas-Works erected complete.

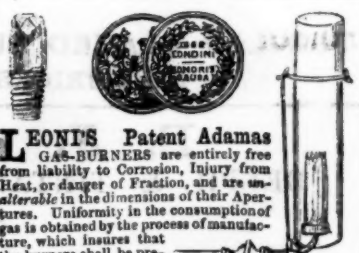
NATURAL

HYDRATED OXIDE of IRON

constantly on Sale. Apply to

MARTYN DENNIS AND CO.,

LIVERPOOL.

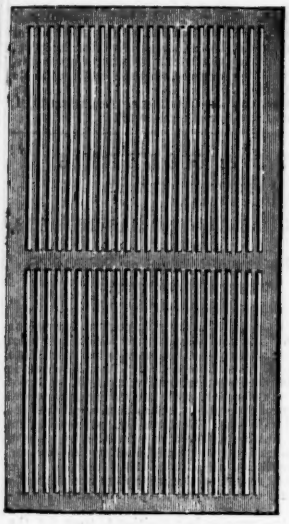


LEONI'S Patent Adamas GAS-BURNERS are entirely free from liability to Corrosion, Injury from Heat, or danger of Fraction, and are *unalterable* in the dimensions of their Apertures. Uniformity in the consumption of gas is obtained by the process of manufacture, which insures that the burners shall be precisely similar in pattern.

Net Cash Price, 8s. per gross.

Patentee and Sole Manufacturer, S. LEONI, 34, St. Paul Street, New North Road, LONDON, N.

WALKERS'
WOOD SIEVES OR GRIDS FOR PURIFIERS.



These celebrated Grids are used for and UNAFFECTED BY EITHER LIME OR OXIDE, WHICH IS SO DESTRUCTIVE TO IRON GRIDS. They are much cheaper, and VERY MUCH MORE DURABLE than Iron Grids.

DRAWING No. 1

Shows our most firm and durable kind of Wood Grids.

They are made BEVEL IN SECTION FOR KEEPING CLEAN, and for LARGER AREA OF GAS PASSAGE through them.

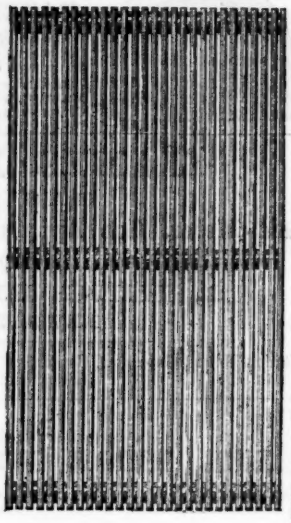
They have outside frames of HARD UNDAMAGEABLE WOOD, which enables them to be COMPRESSED UNDER HEAVY PRESSURE, PROTECTS THEM FROM ROUGH USAGE, and binds them together with STRENGTH AND SOLIDITY.

DRAWING No. 2

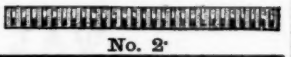
Shows our second quality of Wood Grids of a less substantial and cheaper kind. They are made parallel in section, and are suitable for lighter work.

Prices on application to

C. & W. WALKER,
Midland Works, Donnington, near Newport,
SHROPSHIRE.

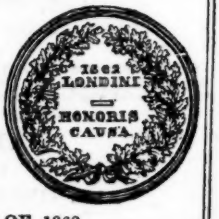


No. 1.



No. 2.

EDWARD COCKEY & SONS,
IRON-WORKS, FROME SELWOOD,
PATENT GAS-VALVES.
A PRIZE MEDAL



WAS AWARDED TO THE PATENTEES AT THE INTERNATIONAL EXHIBITION OF 1862.

These Valves are formed of two cylinders, working one on the other horizontally, having their faces ground perfectly gas-tight.

They are adapted either as central valves, for two, three, or four purifiers—as bye-passes—or as inlet and outlet-valves for gasholders.

They have been fixed in some of the most important Gas-Works in the Kingdom, for more than eight years. Considerably over two hundred of them are now in use, and the most satisfactory reports of their advantages continue to be received. They are simple in construction, and not liable to get out of repair, and if in course of time the faces should leak, they can be easily re-ground and made as tight as ever, without removal from their positions. Each Valve is fitted with an index, which shows to the person in charge of the Works in what direction the gas is passing.

Frome, January 20, 1866.

LIVESEY FIRE-CLAY WORKS,
NEAR BLACKBURN, LANCASHIRE.
ORLANDO BROTHERS,
MANUFACTURER OF PATENT CLAY RETORTS,
AND EVERY DESCRIPTION OF
TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

E. J. & J. PEARSON,
DELPH & TINTAM ABBEY FIRE-CLAY & BRICK-WORKS,
STOURBRIDGE,
PROPRIETORS OF
BEST GLASS-HOUSE POT & CRUCIBLE CLAY;
MANUFACTURERS OF
GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.

KIRKWOOD CANNEL COAL.

This Coal is largely used in the Gas-Works at Glasgow, Paisley, Port Glasgow, Edinburgh, Leith, and many other towns throughout Scotland. It yields 10,618 cubic feet per ton; illuminating power, 27·55 standard candles; coke per ton, 9 cwt. 83 lbs. Railway communication from the pits (at Coatbridge) to all parts of the country; ports of shipment in Firths of Forth or Clyde.

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FIRE-CLAY GAS-RETORTS, &c., CANNEL AND STEAM COALS.

WILLIAM FRASER, Inverkeithing

(owner of the Works at which Fire-clay Retorts were first made), having greatly enlarged his works, can supply retorts and other fire-clay goods to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

WILLIAM FRASER ships COWDENBEATH PARROT COALS at Charlestown and Burntisland at 11s. per ton; and HALBEATH STEAM COALS, on Navy List, at 8s. 6d. per ton.

JAMES OAKES and CO.,

ALFRETON IRON WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water-Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

OXIDE OF IRON,

We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,
BELFAST.

INTERNATIONAL EXHIBITION,

1862. CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c. &c.

SCOTSWOOD FIRE-BRICK WORKS,
NEAR
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HARRIS and PEARSON,

PROPRIETORS OF

BEST CLASS-HOUSE POT AND CRUCIBLE CLAY

MANUFACTURERS OF

FIRE BRICKS, GAS RETORTS, &C.

AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

NB A quantity of best Clay Retorts in stock, viz.—Circulars, 14 inches, 15 inches, 16 inches. D's, 16×12, 15×14, 20×16, 16×18.

HANCOCK'S INDIA-RUBBER GAS-TUBING.

All sizes, from ¼ in. to 4 in. diameter and upwards.

Also,

HORSE SINGEING APPARATUS, best make, with GAS-BURNERS, COMBS, and INDIA-RUBBER TUBING, all complete.

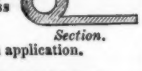
INDIA-RUBBER BAGS for GAS-MAINS.

WASHERS for GAS and STEAM JOINTS.

VALVES (pure solid Rubber) for STEAM-ENGINES.

PACKING (Elastic) for STEAM-ENGINES.

FLANGE TUBING, for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.



Section.

Illustrated Price Lists on application.

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Vulcanized India-Rubber Works,
GOSWELL MEWS, AND 266, GOSWELL ROAD
LONDON, E.C.

Trade Mark. THE MEDAL FOR 1862.

THE ONLY PRIZE MEDAL AWARDED FOR TUBES AND FITTINGS.

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WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE—81, UPPER GROUND ST., LONDON.

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Patentees and First Makers of Wrought-Iron Tubes.

MR. G. W. STEVENSON, C.E., F.G.S., (for the last 10 years Engineer to the Corporation of Halifax), may be consulted upon all matters connected with the construction of gas-works, and the manufacture and supply of gas; also upon the construction of water-works and the supply of water to towns; and also in respect to the sewerage of towns, and sanitary works generally.

OFFICE: 14, Park Street, WESTMINSTER.

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WENLOCK IRON WORKS,

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Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.

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SOCKET, FLANGE, HOT-WATER PIPES, AND ALL CONNEXIONS; RETORTS, HYDRAULIC MAIN, LAMP-COLUMNS, &c.; AND EVERY DESCRIPTION OF CASTINGS AND WROUGHT-IRON-WORK FOR GAS AND WATER-WORKS, STEAM, AND GENERAL PURPOSES.

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

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Gas-Meter Manufacturer,

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EDINBURGH.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

BEST AND HOBSON,

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ROBERT BEST,

100, CHARLOTTE STREET, BIRMINGHAM,

Manufacturers of

CHANDELIERS, PENDANTS, BRACKETS,

Brass and Iron Gas-Fittings, Steam and Water-Cock &c., &c.

Also,

PATENT WELDED IRON TUBES,

For Gas, Steam, Water, and other purposes.

GAS APPARATUS OF EVERY DESCRIPTION.

High-pressure Water-Valves and Cocks, &c., &c.

Plumbers Brassfoundry,

BRASS, COPPER, COMPOSITION, AND LEAD TUBES.

Works: Birmingham, and Great Bridge, Staffordshire.

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GAS-METER MANUFACTURERS.

STATION-METERS ANY SIZE.

PHOTOMETERS, EXPERIMENTAL METERS, PRESSURE-GAUGES, &c.

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FIRE-BRICKS, LUMPS, SQUARES, and TILES of all dimensions.

GAS-RETORTS always in stock.

GARDEN EDGINGS of various patterns.

ORNAMENTAL BUILDING BRICKS.

GRATE BACKS in various designs.

Contracts entered into to set Retorts, erect Furnaces, &c.

Shipments on the shortest notice.

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Wholesale and for Exportation,

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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

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B. CARPENTER'S Improved Wood SIEVES for Gas-Purifiers.

Works: 14, John Street, Pentonville Road, LONDON, N.

The above sieves are used by the principal gas companies in London and the country. Their utility, durability, and cheapness combined, render them superior to all others.

Testimonials from gas engineers who have tested their qualities forwarded on application.

All orders punctually attended to, and estimates given if required.

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GAS ENGINEERS,

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Of any extent at Home and Abroad,

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Established 1840.

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PIPES, VALVES, IRON ROOFS,

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DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

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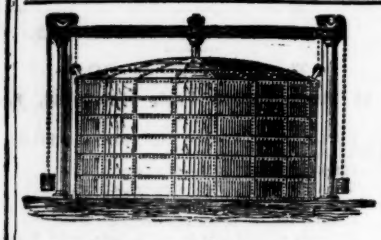

IMPROVED GAS APPARATUS,

FOR TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

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WILL BE SENT ON APPLICATION:—

PLANS, SPECIFICATIONS, and PRICES of GAS APPARATUS;

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PLANS of the IMPROVED ANNULAR CONDENSERS;

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GAS ENGINEER,

is removed to his New Factory,

VINCENT WORKS, VINCENT STREET,

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WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.'s Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

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KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Burs, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge.'

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GAS ENGINEERS,

AND MANUFACTURERS OF

CRYSTAL, BRONZED, & ORMOLU

CHANDELIERS;

IMPROVED CRYSTAL STAR AND SUN LIGHTS;

VESTIBULES,

AND

EVERY DESCRIPTION OF GAS-FITTINGS.

WORKS:

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J. DEFRIES & SONS

Beg most respectfully to inform Gas Companies and the Trade that their

NEW CITY SHOW-ROOMS

Are now complete with every description of Lighting Mediums, including Registered Designs of Mediæval Gas-Fittings, Crystal, Bronzed, Ormolu, and Electro-Plated Chandeliers, Brackets, Vestibule-Lights, Bronzed and Gilt Statuettes.

Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.

GAS MOONS of the Newest Designs.

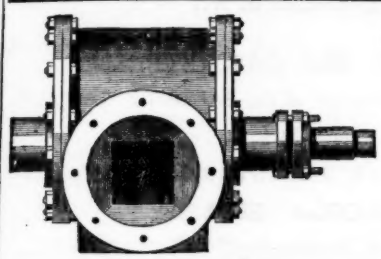
THE PATENT GAS-REGULATOR & PURIFIER

Reduced to 6s. 6d. per Dozen.

Pattern Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1866-67, are now complete.

WORKS:

LONDON, BIRMINGHAM, & PARIS.



ROTATORY AND DOUBLE-ACTING GAS-EXHAUSTERS,

with many recent improvements, from 1500 to 150,000 cubic feet per Hour.

JAMES BURTON, SONS, & WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS,
efficient and durable TAR, LIQUOR, and SYPHON PUMPS,
GAS-VALVES, with or without Wedges, worked with powerful Worm and Rack,
SELF-ACTING BY-PASS VALVES, with Lid and Relieving Lever,
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SMALL-SIZE EXHAUSTERS KEPT IN STOCK.

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Mr. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

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RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS in which the Gasholder cannot tilt and cause accidents.

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"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—ARTIZAN.

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NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

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LONDON AGENT:

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Wharf No. 4, inside Great Northern Goods Station, King's Cross,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

PARIS UNIVERSAL EXHIBITION, 1867.

BRITISH SECTION, CLASS 53.

THE GAS-METER COMPANY, LIMITED,

of LONDON, DUBLIN, & OLDHAM,

Exhibit, in the above Class,

MODELS OF STATION-METER AND GOVERNOR, A TEST GASHOLDER, WET AND DRY GAS-METERS, AND LIQUID METERS;

Principally in Glass, working daily.

Friends and Patrons will find the above well worth a careful examination, as none of the articles have been exhibited before, the whole having been designed and manufactured specially for the above Exhibition.

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B. BRADSHAW,

Representative of the Gas-Meter Company at the Exhibition Building, or at the HOTEL BUCKINGHAM, RUE PASQUER, PARIS.

ALEXANDER WRIGHT & CO.,

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

COMPENSATING & OTHER WET & IMPROVED DRY GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

STATION-METERS & GOVERNORS,

WRIGHT'S REGISTERING PRESSURE-GAUGE, EXHAUSTER REGISTER, & REGULATOR;

STANDARD TEST GASHOLDERS;

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, Pressure Registers, &c., &c.

STANDARD PHOTOMETRIC AND OTHER TESTING APPARATUS,

Employed by the best experimenters in this country and on the Continent, and by the Gas Testers in the London districts.

STREET-LAMP REGULATORS OF THE BEST CONSTRUCTION,

Adjusted to any desired consumption.

R. LAIDLAW & SON,

GAS ENGINEERS, IRON & BRASS FOUNDERS

Alliance Foundry, 147, East Milton Street, and Barrowfield Iron-Works,

GLASGOW;

AND AT SIMON SQUARE, EDINBURGH;

MANUFACTURERS OF

STATION & CONSUMERS METERS, ALL SIZES;

WROUGHT-IRON TUBES, FOR GAS, WATER, & STEAM; CAST-IRON RETORTS & PIPES,

HYDRAULIC MAINS, CONDENSERS, WASHERS, SCRUBBERS, PURIFIERS, & TANKS.

GASHOLDERS;

GOVERNORS, SLIDE-VALVES, &c.;

WROUGHT & CAST IRON ROOFS & HOUSES.

Contractors for Gas-Works of any Magnitude. *Plans, Specifications, and Estimates furnished.*

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